Entered as second-class matter, April 14, 1899, at the Post Office at New York, New York, under the Act of March 3, 1879 (Sec. 415, P.L. & R.).

The MODEL ENGINEER & PRACTICAL ELECTRICIAN

A Journal of Small Power Engineering

4d

Founded 1898
13-16 Fisher St. London W.C.1

Vol. 73. No. 1807. THURSDAY, DECEMBER 26, 1935. Post Free 5d.

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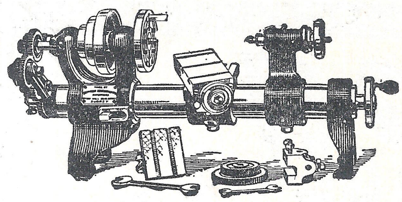

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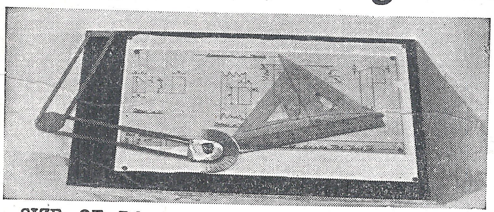

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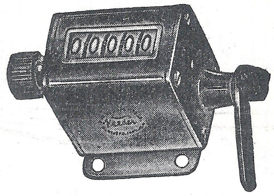

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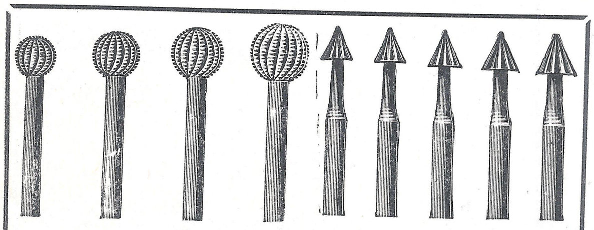

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THE MODEL ENGINEER AND PRACTICAL ELECTRICIAN

A Journal of Small Power Engineering, Tools, Models, Experimental Mechanics, and Electrical and Scientific Instrument Making

VOLUME 73

JULY—DECEMBER

1935

London:

PERCIVAL MARSHALL & CO., LTD.,

13-16, FISHER ST., SOUTHAMPTON ROW, W.C.1

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The asterisk (*) denotes that the subject is illustrated with photographs. The dagger (†) denotes that the subject is illustrated with drawings.

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The
MODEL ENGINEER
Edited by
PERCIVAL MARSHALL C.I.Mech.E

Business Dept.: ALFRED DAWSON
Tech. Research and Workshop Dept.:
ALFRED W. MARSHALL, M.I.Mech.E A.M.I.E.E.

Editorial and Publishing Offices:
13-16 FISHER STREET, W.C.1

Single copies, 4d., post free 5d.
Annual Subscription, 21s. 8d., post free.

VOL. 73. No. 1807 DECEMBER 26, 1935. PUBLISHED EVERY THURSDAY 4d.

SMOKE RINGS

The "M.E." got the Order.

ONE of my subscribers who lives in the Far East, told me an interesting little story, when he called to see me recently during a visit home on leave. He said that the representative of a well-known British firm of locomotive builders was negotiating with a Chinese Railway Company for the supply of some engines. None of his official drawings, however, showed an engine of the type the railway officials really required to suit their service conditions. The builder's representative was puzzled for a moment where to obtain data of a suitable type of engine. My subscriber helped him out by lending him some back volumes of the "M.E." where, amongst our locomotive notes, he found an illustration and dimensions of an engine which just filled the bill. From this information he prepared drawings, which were submitted to the railway company, and resulted in an order being secured for a number of locomotives of that type. So the "M.E." scores again in a rather unexpected way.

* * *

A New Model Railway Book.

WE have just published a new book entitled "Railway Modelling in Miniature," by Mr. Edward Beal. This book differs from previous model railway books in two important respects. Firstly it is mainly written for builders of miniature railways in the "HO" and "OO" scales, i.e. five-eighths inch gauge. This small-scale railway modelling is rapidly growing in favour because of the possibilities it affords of putting down a very interesting and comprehensive lay-out in a restricted space. In these days of flats and smaller houses, many people are debarred from taking up the model railway hobby in the larger gauges because of the lack of room. The miniature gauge dealt with by Mr. Beal solves the problem for them, and his book is the first guide to be published which deals with the subject in a complete form. Secondly, the book is the best exposition of the possibilities of scenic accessories for model railways of all gauges. There are 270 drawings of railway details and scenic accessories of all kinds, and twenty pages of photographs of miniature railway subjects. In addition to its practical information on construction, the book is a definite inspiration in the art of realistic railway modelling, and I have no doubt it will bring many recruits to that very fascinating hobby. The price of the book is 3s. 6d., or post free 3s. 10d.

* * *

The "Cheltenham Flyer's" Record.

ON December 6th the famous "Cheltenham Flyer" made its thousandth run at its record-breaking schedule. The present timing of 65 minutes for the 77¼ miles' "start-to-stop" run from Swindon to Paddington was introduced on September 12th, 1932, when the "Flyer" regained for Britain the world's speed record for a steam hauled train which it held continuously for over 800 runs until last May. The "Flyer" was the first train in the world to be regularly scheduled at 70 m.p.h. or over, and on its 1,000 runs will have covered 77,250 miles and carried over 100,000 passengers, representative of all nations. The highest speed reached by the "Flyer" is 92.3 m.p.h. and the journey has been done in 56 minutes 47 seconds at an average speed of 81.6 m.p.h. Its outstanding feature, however, is consistent running at high speed over a greater portion of the

route. The "Flyer" is drawn by the famous "Castle" class of locomotive which develops about 2,070 horse-power and weighs with tender, ready for the road, about 126 tons. About 36 lbs. of coal per mile are consumed on the run up to Paddington and 3,000 gallons of water used, of which 1,500 are picked up, in 15 to 20 seconds, from the Goring water troughs. These interesting facts about this famous train are, I think, eloquent testimony to the high standard of British railway practice.

* * *

Model Petrol Plane Records.

AMONG some correspondence I have recently received on the subject of model petrol plane records is a letter from Captain C. E. Bowden, which I publish at length elsewhere in this issue. As one of the pioneers of the model petrol plane, and one of our most persistent and experienced experimenters, the views of Captain Bowden are of definite interest. The definition of the conditions for a duration record obviously require some further consideration from the governing body of the sport. The uncontrolled flights of model petrol planes across country should certainly be discouraged. However flattering it may be to the builder of a model plane to know that this machine has flown twenty or thirty miles across country, the element of danger to full-size planes in the air, and to people and property on the ground, is so pronounced, that sooner or later the flight of uncontrolled petrol planes is bound to be forbidden. It is surely better that builders of such machines should take time by the forelock, and introduce control devices which will keep the flight of their machines within a safe area. In these circumstances, the establishing and recognition of duration records would be a much simpler matter, and there would be no room for the element of doubt which now must inevitably exist when a machine passes out of the observer's view. Captain Bowden indicates possible fields for further experimenting with model petrol planes, and the subject is so full of opportunity for interesting research, that it would be a pity if the desire to achieve long cross-country flights were to lead to any prohibitive legislation.

* * *

The Famous "Terriers."

STUDENTS of locomotive history will remember the famous "Terriers" of the former London, Brighton and South Coast Railway. Of the tank engine type, built by Mr. Stroudley, for suburban passenger traffic, these engines were remarkable for the excellent running they made in spite of their diminutive size. No. 40, named "Brighton" was shown at the Paris Exhibition of 1879, and received a gold medal. A few of these engines still remain in the service of the Southern Railway for light duties; others have been sold to various contractors and some of the smaller railways. There are nine of them at work in the Isle of Wight, one on the Kent and East Sussex Railway, and one is running on the Weston, Clevedon, and Portishead line. The January issue of *The Model Railway News* will contain a presentation plate giving a scale drawing of one of these engines, No. 57 "Thames," from the pen of Mr. J. N. Maskelyne, who is so well known for his fine locomotive draughtsmanship. I hope this will be added to the collection of many model engineers as a souvenir of what was probably the most popular class in the old Brighton days.

* * *

From a Lady Reader.

ALTHOUGH the "M.E." is regularly read by many wives and daughters of model engineers, I do not often get Editorial correspondence from women model engineers. I was therefore very gratified a few days ago to receive this nice note from Miss Edith Priestley, of Halifax. She writes :—"May I add my little contribution to your postbag? As one of your lady readers, I should like to express my appreciation and thanks for your friendly little publication THE MODEL ENGINEER. Though not strictly a model engineer myself, I derive much interest from its pages, and look forward eagerly to publication day. I should particularly like to mention the recent articles on 'Winding Small Armatures,' by Mr. A. H. Avery. By the help of these articles I have been able to rewind the armature of my workshop motor ($\frac{1}{2}$ h.p., d.c.). I feel there must be a great number of your readers who derive the same interest from the many practical contributions. I hope this side will long continue. My interest in model engineering is purely amateur, being almost a direct opposite to my daily work, but the age-old thrill of working in metals is always fresh. I find it a most interesting and absorbing hobby, and hope some day to qualify as a real model engineer. May I offer my very sincere good wishes for Christmas and the coming year to yourself and staff." Thank you, Miss Priestley. I am sure all my mere male readers will raise a glass to you this festive season, and wish you many happy hours in your workshop.

Percival Marshall

A 12 in. Gauge 4-4-2 Locomotive.

The Result of Five Years' Miniature Railway Loco. Building as a Hobby.

By W. A. T. FORD.

THE words astonishing, marvellous, wonderful or magnificent do not somehow seem to express what I have seen recently in a model engineer's workshop in Watford.

Calling on Mr. George Flooks to view his latest creation—a miniature railway locomotive *built entirely by himself*—I was somewhat taken aback when this almost perfect "monster" was uncovered. Raised about 3 ft. from the floor on wooden supports was displayed a locomotive 11 ft. 4 in. long, 12 in. gauge, of the 4-4-2 type in almost a finished state, the result of five years' spare time work.

Mr. Flooks is not a young man, although he does not look his age. I well remember that he and Mr. Smithies (of "Smithies" boiler fame) were the first to run a miniature railway as a commercial proposition in this country in the year 1904, over 30 years ago! It may also be remembered by the older readers of the "M.E." that these two engineers built the famous "Nipper" 10¼ in. gauge loco. that hauled the train on this miniature railway at Bricket Wood in Hertfordshire.

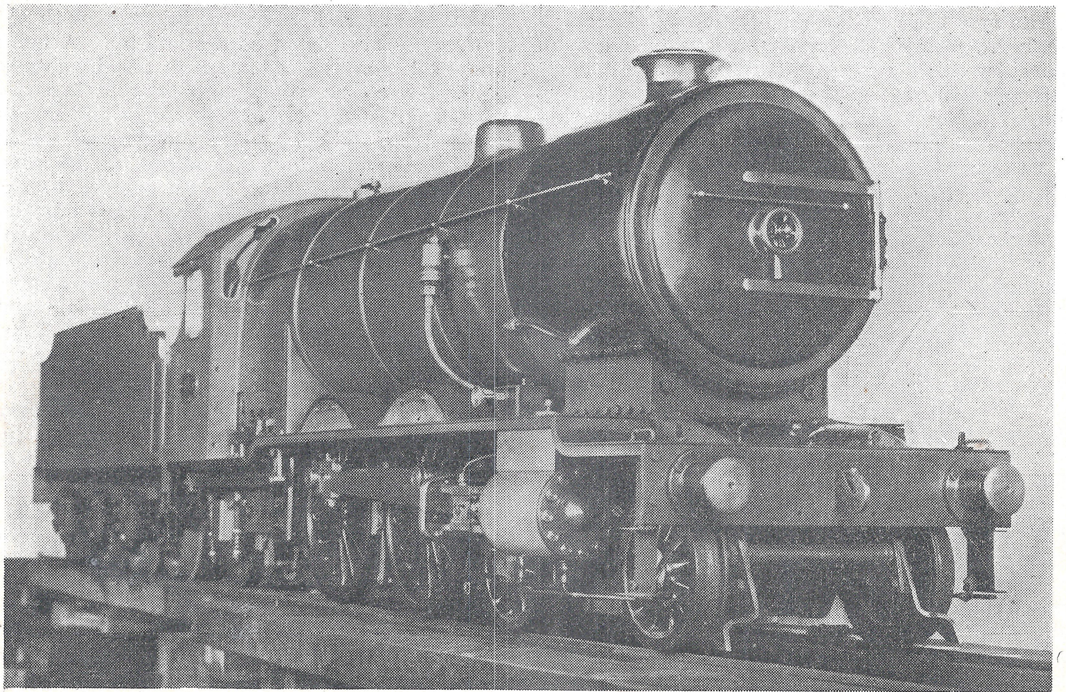
Mr. Flooks' first successful engine was made when he was 16 years of age, and he has been building models ever since. I was shown some of them in a glass-fronted case in his living room. But this latest locomotive, named "Prince Edward," after the baby son of the Duke and Duchess of Kent, is the largest he has ever attempted. It was the most difficult to build; it weighs 9 cwt., is 2 ft. 2 in. high, and has 12 in. driving wheels, these latter "to ensure a quick and smooth start with any load," as Mr. Flooks explained. The loco. has not been tested on a track yet, but by a "Heath Robinson" arrangement, as he said, of lifting the cab-end off the track with the aid of a motor jack, he has been able to turn the driving wheels with as little as 5 lb. per sq. in. pressure.

Although this loco. naturally conforms to the general principles of locomotive construction, it was built to Mr. Flooks' own plans and specifications entirely. He thinks that half the fun of loco. construction is gone if one builds an exact copy of some famous engine.

I was shown quite a number of new and interesting constructional ideas incorporated in this loco., but was not given permission to divulge them. Suffice it to say, however, that what I saw mostly bordered on "inventions."

Everything on this loco. was made by Mr. Flooks himself, with one exception—the pressure gauge; he made all his patterns from which the castings were made, and every other part was made from new material, no scrap being used. One small job he will have to do or get done outside his own workshop is fluting the connecting rods. Mr. Flooks works in an atmosphere of locomotives, as when in his workshop, one hears the roar and noise of the L.M.S. main line trains as they pass by just outside.

In a quick look round his almost complete model engineer's workshop, I noticed a number of home made tools. These, Mr. Flooks remarked, seemed always the best to work with,



"Prince Edward," Mr. G. Flooks' 12 in. gauge miniature railway loco.

and gave him more enjoyment in use, because he had created them himself.

As soon as a customer comes along for "Prince Edward," he is ready to start on building another. He has many new ideas for better engines, and his only regret is that he will not have time in his life to make all he would like to do.

Let us read in the following notes what Mr. Flooks has to say about this latest engine of his:—

I have just completed another 12″ gauge loco., and although many of your readers may consider it too big, there may be a few who will be interested in this short description.

At the outset, I might admit that I am not a "scale" model enthusiast, although I admire a "true to scale" job. I much prefer (as a pastime) to work free-lance to my own drawings, patterns, etc., having had many years (in business) of working strictly to other men's drawings. This new loco. is built very much on the same lines as two I made many years back. These were very successful, and stood up to real hard work on commercial miniature railways for ten years, the mileage amounting to many thousands of miles; in fact, one is still at work, having had three boilers in 30 years.

A few years back, I got the "urge" to begin again. Consequently, nearly all high days, holidays, slack time and spare time have been devoted to the job. What a vast amount of pleasure one can get out of it! Some folk say, "It is the hope of reward that at all times sweetens labour"—perhaps so—but I must say, with many of my fellow model engineers, that my greatest pleasure is in the actual building. This is perhaps surpassed for a few moments by the thrilling music of regular and sharp beats from the funnel, when the tap is turned on for the trial run.

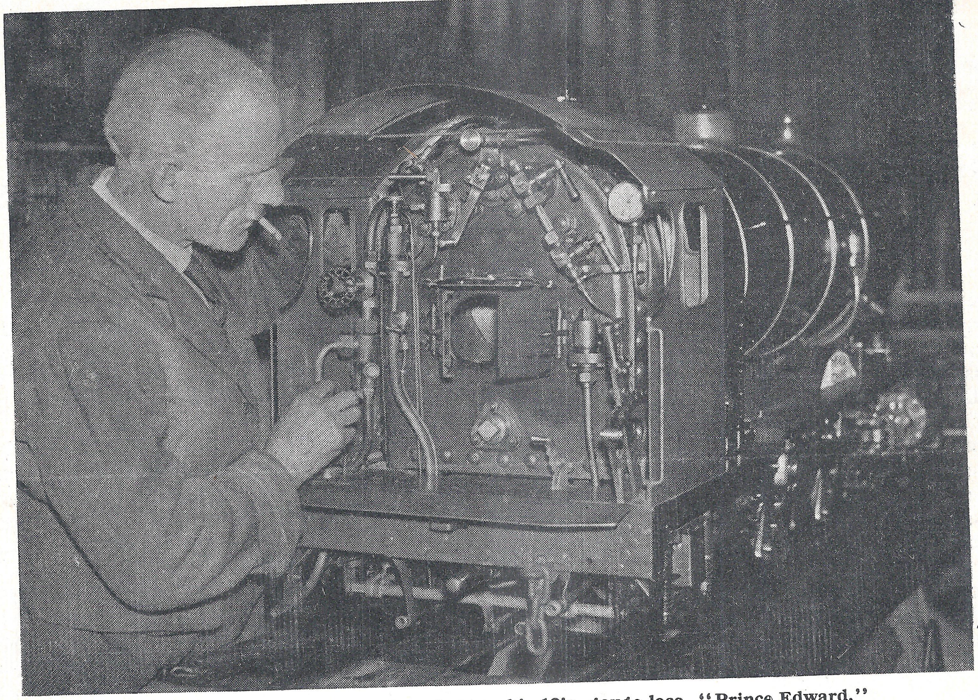
"Prince Edward," which was under steam for the first time on the day the young prince was born, is a 4-4-2 type with small drivers. I consider this a very suitable type for serious passenger hauling, giving plenty of room for a large firebox, a fairly flexible wheel base, and good accessibility. Practically the whole of the turning has been done on a 5″ German lathe with an 8″ gap. There was only one job on the driving wheels which called for a lathe of greater capacity, and that was the boring of the crank pin holes. These I bored on a huge "Britannia," which was only used for very rough jobs. By tightening up the headstock so that a 7 h.p. motor would scarcely turn it, and screwing up the slide rest so that I could just move the handles, I managed to bore some very fair holes. All the wheels are cast in "Crucible" steel, as common cast iron has but a very short life with a loco. of this weight. I do not fit tyres until the treads are worn down too far for re-turning; it is then a simple job to turn treads flat and shrink steel tyres on.

The crank pins and several other steel parts are made from "Ford" spares (not old scrapped parts) but new half axles, etc., as I have found in experience this steel to be of particularly good quality. All the small pins are made from "Ubas" steel, case hardened and ground. The axles are of 2 per cent. nickel steel. The main frames are 7/32″ plate drilled out. This is soon done with high-speed drills, and then introduced to a fairly large emery wheel. After this, of course, come the file and elbow grease. I have made a point of increasing the proportion of sizes in wearing surfaces in crossheads, guide bars, axle boxes, big ends, etc. If these parts are kept to something like scale size, wear is soon noticeable. The crossheads have a solid steel centre, and the slides (phosphor bronze) are dowelled in position, so that shims can be used to take up wear.

Having had a fair amount of experience with modern motor cars, and discovered their inaccessibility as regards repairs, I have tried throughout this job to make every part fairly "get-at-able." This of course entails a lot of extra work, but its well worth it when adjustments have to be made. Link motion is fitted, mainly because I am of the opinion that it can be made massive enough to stand up to wear for a very long mileage, and in this type of loco. there is plenty of room to build the motion of large dimensions. The cylinders are fitted with step-cut rings. The steam pipe joints are fitted with gland packing to allow for any expansion. The lubrication of the cylinders is effected by two displacement lubricators fitted under the footplate. These deliver oil to piston tops. There is also a cam-driven submerged pump which delivers into steam pipe. The lubrication of guide bars, piston rods, valve rods, etc., is by gravity wick feed from tanks under side footplates.

Now with regard to the water supply to boiler, I do like to get plenty of water in with the minimum of trouble. I have, therefore, fitted a main pump ($1\frac{1}{4}$″ ram) driving off front coupled axle, and from the same eccentric operating a smaller pump ($\frac{7}{8}$″ ram). This can be cut in from the footplate when driving, if the engine is working particularly hard, to top up the water level. An injector with $\frac{1}{2}$″ delivery is also fitted as a stand-by. A hand pump ($1\frac{1}{4}$″ ram) is fitted in tender for filling when cold. All check valves and other fittings are made from solid gun metal castings, and are all flange fitted to boiler. The water gauge, which can be seen in photo, is, I admit, on the large side and will, I expect, be an eyesore to the "true to scale merchants," but it *does* tell the truth. The regulator is of the modified "Stroudley" type. The blower, ring pattern, is fitted over exhaust nozzle. The blower pipe is taken from cab end under lagging and carried out outside smokebox, where a Y joint and union are fitted for steam raising by air pump.

The boiler is steel $\frac{1}{4}$″ plate, girders on firebox top, large wide firebox, grate area 156 sq. in. There are 3 wash out plugs at the bottom of firebox and a manhole large enough to get an arm in. What a boon this is when fitting the regulator, and is a still greater boon when boiler requires washing out. The boiler is lagged with $\frac{1}{4}$″ asbestos millboard, held in position by $\frac{1}{2}$″ × $1\frac{1}{2}$″ wood laths, which in turn are fixed with brass bands. The whole is then covered with planished steel in sections, the outer bands holding these in position. The wood laths are spaced to come into line with



Mr. G. Flooks inspecting the cab fittings on his 12in. gauge loco, "Prince Edward."

the hand rail knobs, and where these knobs are screwed in, brass pads are sunk into the wood. This makes a very solid fixing for hand rail without drilling into boiler, and the lagging sections are easily removed. The steam brake is fitted under the footplate, and operated by a 3-way cock, acting on 6 wheels.

The one great difficulty with engines of this size, when tackled by one man, is in lifting to fit or remove wheels, etc. By the time the frames are finished, wheels in position, and cylinders fitted, the job is more than one ordinary man can lift. Consequently, block tackle has to be installed. I was often tempted to call in a squad of our "local lads" (The Watford Model Engineering Society), who would, I know, willingly "lend a hand," and when it came to placing finished boiler in position ($4\frac{1}{2}$ cwts.), I started round to collect them. However, I chanced on a nice piece of H girder lying around in the local scrap iron man's yard. This was installed cross ways over engine, and after making up a serviceable runner for my block tackle, I was able to do the job alone quite easily. This is a curious fact, if I should call in any friend (not at all acquainted with model locos.) to give me a lift, he would most likely grab the edge of footplates or the small copper tubes to cylinder drain cocks, to lift a chassis weighing about 3 cwt.

The tender, which is not shown clearly in photo, is of the bogie type, wheels same size as engine trailers. A few of the principal dimensions are :—

Cylinders—(2) $2\frac{3}{4}'' \times 4\frac{1}{2}''$.
Wheels.—Bogie 7″; coupled 12″; trailing 8″.
Boiler.—Barrel 35″; diameter $13\frac{1}{2}''$ to $14\frac{1}{2}''$; working pressure 120 lbs. per sq. in.
Tubes—35.
Superheater—(Smokebox).

Heating Surface—	Tubes ..	3,525	sq. in.
	Firebox ..	348	,,
	Superheater	98	,,
	Total ..	3,971	,,

Length over engine and tender 11′ 4″.
Weight—Engine 9 cwt. (working order).
Tender 2 cwt. (working order).

Making Small Box-Spanners.

The average mechanic, when called upon to make a box-spanner for a six-sided nut or screw-head, or a key for a four-sided screw-head, will almost invariably drill a hole equal to the size across flats of the nut or head, and then drift out the surplus metal to form the corners. This process is rather tedious, as it is necessary to make a drift, perhaps more than one, for each size of spanner or key.

If the job is given to a blacksmith, the procedure is quite different. In making a box-spanner for a hexagonal nut, the blacksmith drills a hole equal to, or slightly more than, the size of the nut across *corners*. The nut, or a piece of hexagonal mild steel, is then placed in the hole, and the metal or wall of the spanner is closed on to the nut, thus converting the round hole into a hexagonal one without the need for a special hardened drift.

Serviceable box-spanners and keys can be made from steel tubing of suitable size, the end of a tube being heated to a good red heat and closed on to a nut of desired size. The writer has frequently made small spanners and square-hole keys from ordinary door keys in this manner, the steps first being cut off, and the eyes forming a convenient means of turning the spanners. R. HUTCHESON.

C

PETROL ENGINE TOPICS

Simple Components for Small Engines.

By EDGAR T. WESTBURY.

(*Concluded from page* 591.)

A Simple High Speed Contact-breaker.

Many people who build very small engines like to keep the size of the accessories as near as possible to scale, and I have seen some very neat little contact-breakers on such engines; one at least was no bigger in diameter than a halfpenny. While I am all in favour of the exercise of fine workmanship on model I.C. engines, which are only too rarely built with the skill they deserve, there are some disadvantages in these tiny components from the purely practical point of view.

Delicate or fragile mechanisms do not generally stand up long to the rude usage they receive in petrol engines which live the hectic life, as in speed boat work; also they are liable to be a little difficult of access for cleaning or adjustment. Another more important disadvantage, in the case of very small contact-breakers, is the reduction of actual contact area. This is a serious matter, because if the area of the contacts when they are closed is too small, their resistance will be increased, and ignition efficiency is thus reduced; also, they may heat up in use and become rapidly destroyed. The voltage used in most models is so low that one cannot afford to waste it in unnecessary resistance; I have often thought that we should be better off if we used a higher voltage, if only to make up for the inevitable losses in the wiring and switchgear, which are much greater than is commonly supposed.

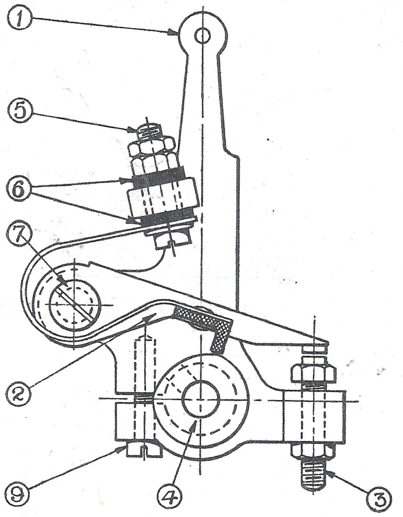


Fig. 2. Contact-breaker employing a Delco-Remy lightweight interrupter arm.
(1) backplate, (2) interrupter arm, (3) contact screw, (4) cam, (5) terminal, (6) insulating bushes, (7) pivot screw, (9) clamping screw.

It is rather difficult to do anything about this, however, as the popular 4-volt accumulator is, so far as I know, the only one available which is reasonably light, with a sufficiently high discharge capacity for our purpose.

This, however, is by the way; the matter under discussion is the design of the contact breaker, which is a vital factor in the practical success of the ignition system. Many designers in recent years have made use of standard components as employed in automobile practice, in the construction of this unit, and although some of the devices evolved round these ready-made parts are very clumsy looking, most of them work very well, which is the main point. Without going so far as to claim complete originality, I think I may say that I was one of the first to use a standard motor car interrupter arm in a model engine contact-breaker, and I have produced several types in which various makes of arm are employed; all of them have been thoroughly successful, but some types are better than others at very high speed, depending mainly on the lightness and rigidity of the arm, and the *design* (not necessarily the stiffness) of the spring, in conjunction with the form of cam used to operate them.

Some time ago my attention was drawn by Mr. Elmer A. Wall, of Chicago, to a type of interrupter arm which appears to be particularly well suited for use on model engines. It is made by Delco-Remy, and the catalogue number is No. 1842058. Being extremely light and stiff, it can be relied upon to work at practically any speed likely to be required; I have personally tested it up to 14,000 breaks per minute.

I have adapted this arm to the contact-breaker shown in Fig. 2, which is extremely simple to construct, and can be guaranteed satisfactory. The backplate (1) may be either cast or cut from a solid piece of aluminium; in the latter case the spring stop and contact block should be securely riveted on. It is clamped on the bearing housing by means of the screw (9), sufficiently tightly to prevent unwanted movement, in cases where the extremity of the lever is not coupled to a control rod. The Delco-Remy arm (2) is pivoted on the screw (7) 3/16″ diameter on the plain portion, turned down to 4 B.A. and lock-nutted to the backplate. The only insulation needed consists of two fibre washers (6) with spigots fitting the enlarged hole in the spring stop; the screw (5) securing the tail of the spring forms the terminal. It should be noted that the arm is insulated from the pivot by means of a fibre bush.

The design of the cam for this contact-breaker is of some importance, if the best results are to be obtained, but it is by no means difficult to make. This type of cam has the major part of its circumference quite concentric, and instead of a "lift" it has a "drop," formed by cutting away the base circle. In many cases, a flat filed on the cam, to form a chord extending over the required closed contact angle, will do all that is necessary, but for really high speed work, this is too abrupt, and tends to throw the arm up violently, with abnormal wear and tear, and also a tendency to break springs. Nowadays, I usually form

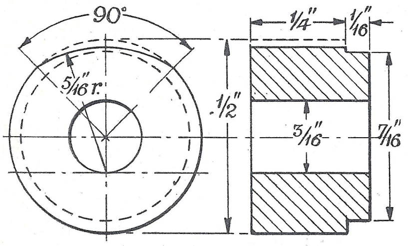


Fig. 3. Cam for high-speed contact breaker.

the cams by setting the blank, turned to the required base circle diameter, slightly eccentric, for the purpose of cutting away the drop, as shown in Fig. 3.

The whole procedure in making the cam is extremely simple; just chuck a short piece of rod sufficiently large to turn the base circle of the cam (in this case $\frac{1}{2}$ in.) and machine the outer diameter and shouldered clearance portion (if any); then bore the central hole quite truly. Now, before parting off the cam, set it to run slightly eccentric; this can very easily be done by packing one of the chuck jaws. The cam is then turned on the new centre sufficiently to provide the desired closed contact period, usually about 90° for a four-stroke engine, and rather longer for a two-stroke. When finished, the cam must be case hardened on the working surface.

Attaching Cam to Shaft.

In my experience, a great deal of ignition trouble is traceable to cams being badly mounted or located on their shafts. Sometimes one encounters a cam with its base circle running eccentrically, due to the shaft being out of truth, or the hole not central, and this may result in a false break, or bouncing of the arm at high speed. The cam is often screwed to the cam shaft, with a locking nut to prevent rotation, which it usually fails to do at a critical moment. Grub screws, when used for securing the cam, frequently work loose, and apart from the timing being destroyed, this often results in damaging the friction pad on the interrupter arm.

I have often employed grub screws for securing cams, but not without some means of securing them against slackening. The point of the screw should always engage a sink in the shaft, and should be a fit in it, while a simple way of locking is by sweating over the head with solder; a crude method, but very effective.

A much better method of fitting the cam to its shaft is by means of a cross key through the latter, engaging a notch in the back face of the cam, as shown in Fig. 4. The end of the shaft, in this case, is screwed to take a nut, which holds the cam against the locating shoulder and in engagement with the key. Taper fits are sometimes employed, but are not really necessary, and may make the cam somewhat difficult to remove.

In some cases it is possible to dispense with a separate cam, and form the end of the shaft to serve the same purpose. Providing that the shaft diameter is large enough, this is quite good practice, but do not forget that case-hardening is necessary to avoid rapid wear; also take care that the break is correctly timed. Mistakes are very easy to make, and I remember that I once, when making a solid camshaft, put the "make" of the ignition cam where the "break" should have been. Fortunately, I was able to save the situation by altering the position of the interrupter arm, but otherwise it would have meant scrapping the entire camshaft, with spur gear and two cams, all cut from the solid.

Contact Materials.

Occasionally one encounters cases where ignition trouble is experienced through using material for the contact points which is unsuitable; I have even seen people trying to get an engine to run with silver steel contacts! It is of course, absolutely essential to use a material which will not burn, melt, or corrode away for this purpose. A few years ago, the only material which was considered of any use whatever for ignition contact points was platinum-iridium; pure platinum is, of course, much too soft to stand up to the wear and hammering which it encounters in a petrol engine contact breaker. Nowadays, the material almost universally employed is tungsten, which is really better adapted for really hard usage, especially in coil ignition systems

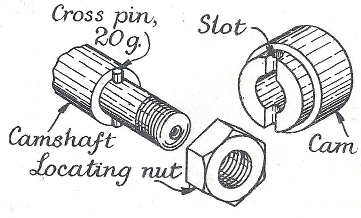


Fig. 4. A sound method of securing contact breaker cam to the shaft.

of comparatively high voltage. In some quarters, I find that model engineers have a preference for platinum, apparently on the principle that the more expensive material is bound to be superior in use. According to my experience, however, this is a fallacy; the only advantage I have been able to find in platinum is its ability to "burn itself clean" of oil or other foreign matter, which in the case of tungsten forms, a high resistance tarnish film, but is easily removed with fine emery cloth. From the point of view of long wear, and maintenance of adjustment for long periods, I am inclined to think that tungsten is best, in spite of its cheapness.

SHOPS SHED & ROAD

A Column of "Live Steam."

By "L. B. S. C."

Another Round Trip Completed!

I don't know how you find it, brother loco. men, but it seems to your humble servant that the farther we go along the Great Railroad of Life, the more the traffic on it seems to emulate the Cheltenham Flyer, the Silver Jubilee, and other contemporaries of the material tracks. It surely does not seem a year since I gave you the "Engineman's Toast," yet so it is; and once again we hear in imagination the hiss of the air and the screech of the brake blocks as we come to rest alongside the platform, with its merry crowd of folk, many of whom are our own kith and kin, and the rest our good friends. The jolly old white-bearded station-master is there, just as stout as ever in his red uniform, and his voice loses none of its vigour as he shouts "Christmas Junction! Christmas Junction! Change for Hollytown and Mistletoe-ville!" As the crowds pour out of our train, mingling with the waiting throng and exchanging joyous greetings, we remember with just a little touch of sadness, that many who travelled the line around with us last trip, have left the train at some wayside station, and will, alas! never rejoin it any more; but joy once more enters our hearts when we see among our passengers the new comers—kiddies—who are making their first trip, and will be keeping the old train going when we have signed the report book for the last time, and have no further need of a tommy-basket and tea bottle.

A few more days, and the crowd of passengers will meet once more, at the "departure" side of the platform. Old signalman Time, in his cabin at the end of the platform, will watch his hour glass, and as the last sands run down, he will pull his levers and set the road for the new journey. With a clanging of bells, and a blast on the whistle, we shall start away and pull out on to No. 1936 track, and so another round trip will have begun. Brothers and sisters who read this little fantasia, the old arab who is writing it would like to say a word to each of you personally. Whether you handle regulator, controller, or I.C. throttle; whether you are one of the train staff; whether you are a passenger riding in the coaches, it matters not—I just want to say to *you*, brother or sister, that it is my sincere and earnest wish that your journey through 1936 will be the best, in every respect, that you have ever made, and may the Great Operating Manager grant that it may be so. Green board—right away!

Streamlining—A Pertinent Question.

Of course, we all know that the opinions of the brotherhood who earn their daily crust on the footplate of a locomotive, are "unscientific," and therefore not worth two sips of cold—ahem—tea, but two or three of them who have written me in comment about the recent paragraph on streamlining, have raised a point which seems to require a little explanation. The wind doesn't always blow in a fore-and-aft direction relative to the train; in fact, the total time a train is head-on into the wind, or near it, is probably not a great amount, as the line curves about even if the breeze blows steadily. Therefore, for a greater part of its journey, it is pretty safe to assume that the wind pressure is at the side of the train. Every engineman knows that a side wind is a far better "brake" than a head wind. Now one of the features of a streamlined train is that the spaces between the coaches, and between tender and first coach, are all closed in. Our driver friends argue—and I believe it to be right—that this unbroken line of resistance to the wind, causes the train to be forced over against the rail to a much greater extent than an ordinary train with spaces between the coaches, thereby giving rise to undue flange

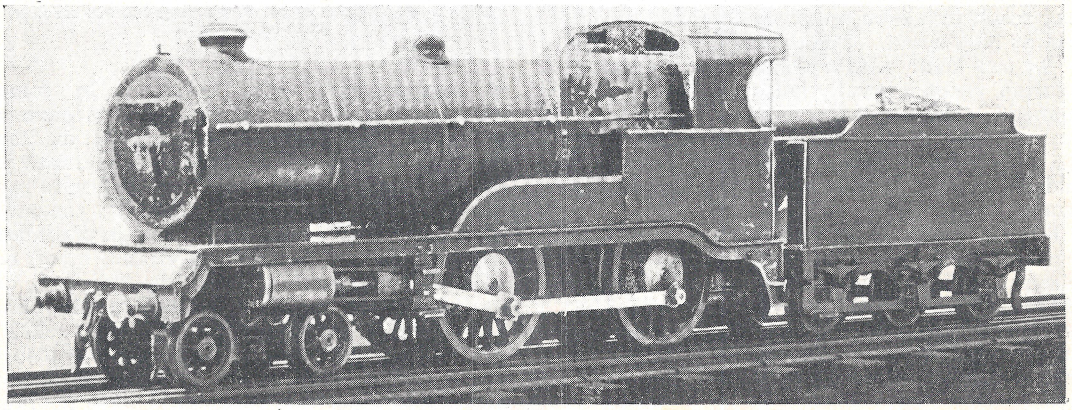


Photo by] **She can "keep on keeping on"** [*C. J. Grose.*

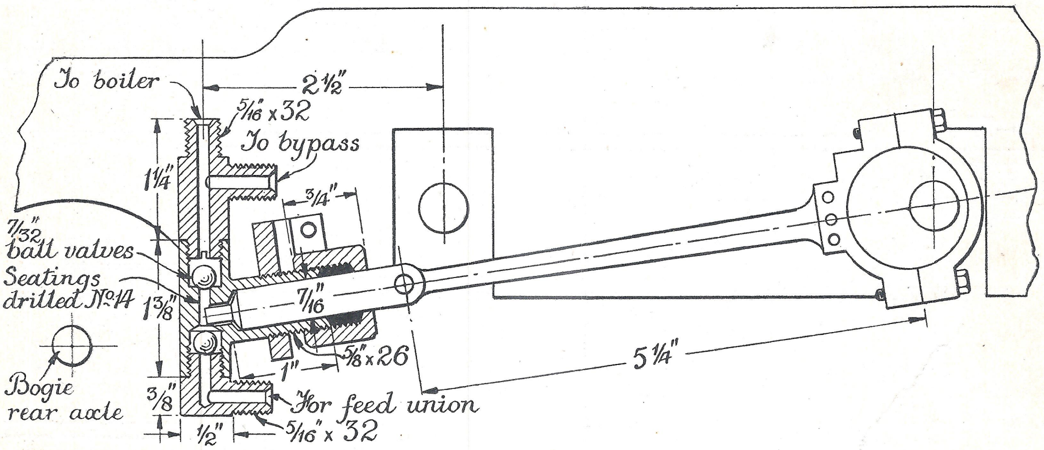
friction, which might well offset anything gained by reduced wind pressure on the front of the engine.

This appears to be sound reasoning. During the recent gales, I noticed around the backs of the houses, that the open paling fences had "weathered the storms" all right, but many of the close-boarded fences were blown down. Only a few doors away from our hacienda, a close-boarded fence which had been strengthened up with spur posts made of concrete, had taken a sag, the wind pressure on it being so great that one of the concrete spurs had snapped; and I wondered at the time, how much flange friction there would have been with a wind of equal force blowing direct at the unbroken side of a streamlined train. An old ex-London and North Western locomotive official, writing on this subject, recalls that on the night of the Tay Bridge disaster in Dec., 1879, when a section of the bridge was blown down and a train fell into the river, the passengers were warned at the previous station to *keep all the carriage windows open whilst the train was crossing the bridge*. Those Scottish railway-men knew something about wind pressure!

Anyway, there it is, and personally I reckon that there is a dickens of a lot in the argument. I notice that the side shields over the motion of the Great Western "King" and "Castle" engines have been taken off, the reason given being that the bearings ran warm, owing to lack of air cooling; but that wasn't the *only* reason. What those two engines did to the ballast when doing the knots, was what our cousins over the pond would term "nobody's business." My proposed shielded "underneath" would whip the ballast to a certain extent, but I don't think it would lift or shift it to anything like the amount that the flying rods, etc., of an engine travelling at nearly two miles a minute, would do. It certainly would keep the ballast dust and grit out of the motion, which IS most important at such a terrific lick. I have suggested a special shape for the shield, as you'll see when the sketch of "Miss Greased Lightning" comes out.

A Gauge 1 "Nonstopper."

We often hear of old veterans on the full sized roads still going strong, and doing wonderful work considering their age and condition; and there are doubtless many among the smaller fry which can, and do, put up very comparable performances. Such an engine is shown in the picture. She was originally built by a North Country professional maker, to the special order of a brother in Yorkshire, and runs on a continuous track having curves of only 6 ft. 6 in. radius. She was quite good, and ran in her original condition as built, for quite a considerable time; but about seven years or so ago, I had her in my old shop at Norbury for a few light repairs, and took the opportunity to give her the "monkey-gland injection." Result as usual—speed, power and length of run increased to a very great extent. Since that time she has run many miles; and at long last the brass cylinders have worn badly, and a new pair of bronze ones are needed, so she has come to me once more.



Section through "Maisie's" Feed Pump.

But note this—even in her present condition, she can put many a new engine of modern type to shame, for her owner says she is still capable of hauling eight bogie coaches at a high speed around the sharp curves of his track on which the train is never straight, *for thirty-three minutes non-stop; and this is done without putting a drop more water in the boiler, as the engine has no pump, either hand or mechanical.* The distance covered is well over one mile. If the engine had a mechanical pump, she would run non-stop for over the hour, easily. She is spirit-fired

The owner of the engine has three more which have been rebuilt with my own cylinders and motion, and the monkey-gland setting; they are a "Pacific," an "Atlantic," and a 2-8-0. None of them has any pumps; they were all rebuilt around 1925/26, all are still running, and they run from 30 to 37 mins. non-stop, the "Atlantic" with nine coaches, and the 4-6-2 and 2-8-0 with thirteen to sixteen coaches on the one filling of the boiler. This is good work for the 2-8-0, which only has 1⅞" driving wheels; her valve gear is American Southern, and she runs notched up almost to middle. Both 2-8-0 and "Pacific" will haul an adult passenger. Through pressure of work on prior jobs, and "one darn thing after another," the re-cylindering of the 4-4-0 has been unduly delayed; but when she's done, I'm going to

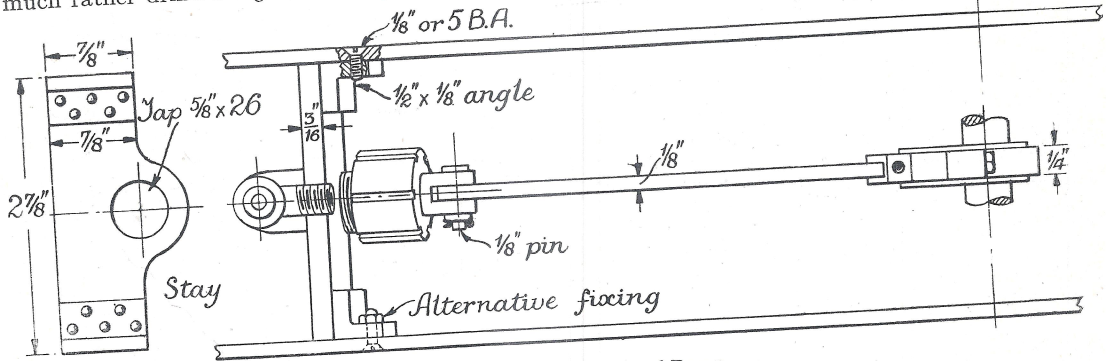
beg permission from Mr. V. B. Harrison to test her over his magnificent scenic line.

" Maisie " (*Continued*).—Feed Pump.

Those brothers who complained that the lack of a motion plate on sister Maisie was going to weaken the frames, will now see that their fears were groundless—trust your humble servant !—for the stay carrying the boiler feed-pump takes its place, and does the doings just as efficiently. The pump itself follows my usual " tried and proved " practice, the only variation being that the body is set slightly on the slant, as the eccentric rod passes under the first coupled axle. It wouldn't really matter if the barrel is set horizontally, as the eccentric rod is plenty long, and the angular push wouldn't be sufficient to cause undue wear on the gland and ram ; but you all know what old Inspector Meticulous is like when he gets well hotted up, and I don't want to stroke the old boy's fur the wrong way at Christmas time—I'd much rather drink his good health !

Fit a nipple, made from a bit of 5/16″ round rod, to the upper part of this gadget, as shown in sketch, and silver solder it. The bypass pipe is connected to this, and saves making any joints in the feed pipes. The bottom cap, forming the suction valve seating, is turned from a bit of $\frac{1}{2}$″ rod held in three-jaw. Turn down $\frac{1}{4}$″ of it to 5/16″ diam. and screw as before. Face, centre, drill down about $\frac{1}{2}$″ with No. 14 drill, skim off any burr, and part off $\frac{5}{8}$″ from end. Fit a similar nipple to that used for bypass, as shown in sketch. The balls are rustless steel, 7/32″ diam., and are seated by the usual hammer blow via a bit of brass rod. The lift should be about 1/32″. Don't screw the top and bottom valve caps in for keeps until the pump is mounted on the stay.

The ram can be either rustless steel or bronze, 7/16″ diam., and a full 2 5/16″ long overall. Turn down one end for a length of 5/16″, to 3/16″ bare diameter ; this forms the anti-airlock pin—the little gadget which makes all my pumps certain feeders. The other end is slotted to take the $\frac{1}{8}$″ eccentric rod, cross-drilled



Plan of " Maisie's " Feed Pump.

The valve box is a piece of $\frac{1}{2}$″ round rod (gunmetal or bronze) squared off to a dead length of $1\frac{3}{8}$″. Centre and drill right through, No. 14 drill. Open out to 9/32″ diam., and bottom with a D-bit, so that the hole is $\frac{1}{2}$″ deep. Tap 5/16″ by 32 and slightly countersink. Reverse and repeat, except that you needn't bother about D-bitting the hole. For the barrel, part off a 1″ length of $\frac{5}{8}$″ bronze rod. Face, centre, and drill right through 7/16″ ; ream it if you like a posh job. Screw the end for a length of $\frac{5}{8}$″, any fine thread you happen to have a die for ; or screw-cut it 26 t.p.i. File off the end to a slight angle, saddle it to the valve box with a half-round file, tie in position with iron binding wire, and silver solder in place. Run the 7/16″ drill in, and make a countersink on valve box ; drill into centre waterway with 3/16″ drill. The gland nut is made from a $\frac{3}{4}$″ length of 1″ rod, and needs no detailing out. Have the threads rather tight, so that the gland will not slack off when the engine is at work.

The top of valve box is made from a piece of $\frac{1}{2}$″ round rod $1\frac{1}{2}$″ long. Chuck, face, centre deeply with Slocomb, and drill right through No. 30 ; turn down $\frac{1}{4}$″ or so to 5/16″ diam. and screw 32 threads. Reverse, turn down for $\frac{1}{4}$″ length and screw same as other end. Make a cross nick with a file, so that the ball cannot block the waterway when rising off its seat.

for a $\frac{1}{8}$″ gudgeon pin, and rounded off. The pin can be turned from a bit of $\frac{1}{4}$″ steel, and is an easy push fit in the hole in ram, which should be reamed. It is secured by a washer and split pin, as sketch. The split pin can be made by filing a flat on the end of a piece of 20 gauge wire, cutting off and bending to shape.

It is quite possible that those of our advertisers who specialise in Live Steam supplies, will be marketing a casting for the pump stay ; but if they don't, get a piece of $1\frac{1}{2}$″ by 3/16″ flat brass rod, and cut to shape shown in sketch. Rivet on two $\frac{7}{8}$″ lengths of $\frac{1}{2}$″ by $\frac{1}{8}$″ angle, for attachment to frames. Drill and tap the big hole, and screw in the pump barrel, taking care that the valve box is upright. The top and bottom caps can then be fitted ; don't forget to put the balls in (maybe you think that remark superfluous—well, don't you believe it ! The best of us is liable to slip up sometimes), and if the nipples don't screw in far enough to line up with the pump barrel, file a shade off the valve box ends until they do. Put a taste of " Bosswhite " or other plumber's jointing on the threads.

The eccentric strap is machined in four-jaw chuck as already described, and the rod is sawn, filed or milled from $\frac{1}{2}$″ by $\frac{1}{8}$″ flat rod. The big end is riveted into the slotted eccentric lug before marking off and drilling the eye, which should be $5\frac{1}{4}$″ from centre of strap. Case-

harden it, same as given for valve gear parts, and polish up.

To erect the pump, put the whole lot together and push the stay up between the frames, so that the pump is in approximately correct position. Put the eccentric on forward centre as shown in sketch, then push the pump towards it until the ram bottoms in the pump barrel. Then move the whole pump bodily forward, toward front of engine, about 3/64″; see that the height is correct, the valve box vertical, and the stay square across the frames; then put a toolmaker's cramp on each side to hold the whole bag of tricks temporarily in position. You can either drill three No. 30 holes clean through frame and angle, and fix by countersunk screws with nuts inside; or you can drill through frames with No. 30 drill, stopping when the drill hits the angle. Then take out pump, drill the marked places No. 40, and tap 5 BA or $\frac{1}{8}$″, finally replacing pump, countersinking holes in frame, and fixing with screws driven into the tapped holes in the angles. Pack the gland with a few turns of graphited yarn, and don't screw too tightly. When the engine is on the road, the gland should be screwed up just enough to prevent leakage, and no more.

Tools in the Competition Section of the "Model Engineer" Exhibition.

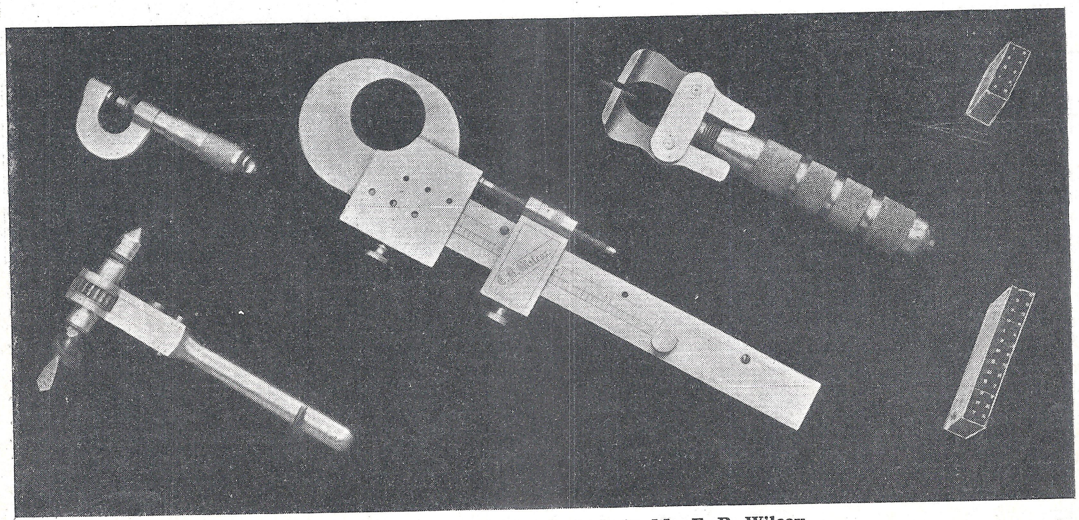
By GEORGE GENTRY.

THE tools of the competition were above the average, but it is interesting to note the type of tool making which appeals most to those competitors who lean to this class of work. In order to do so, the following analysis has a distinct bearing :—

In seventeen distinct entries, all of which, with the exception of two, were entered by different exhibitors, there were nineteen distinct pieces of apparatus, not counting those in group form other than as one. These comprised 3 "parts of lathes"; 9 "lathe accessories"; 4 "machine tools," complete (3 of which were drilling machines), and 3 only were "hand tools" (one of which was in group form). So that hand tools are scarcely to be considered as popular with competing exhibiting tool makers.

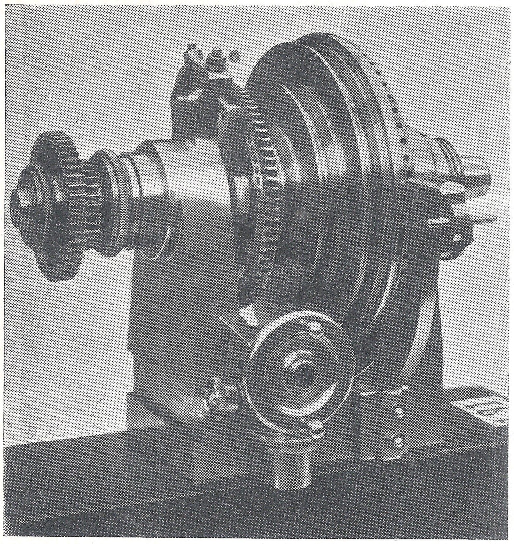
It is not proposed to describe all these, but to deal with those which in the opinion of the writer are likely to be of most interest, without any reference to the opinion of the judges, except to state actual awards as given to those described, and to try and explain away any anomaly that may be apparent.

The most interesting, as hand tools, were a group of hand made tools and micrometers made and entered by Mr. E. B. Wilcox, of Weaverham, Cheshire. A photo is given of these as mounted for exhibit. They comprise: a 6″ micrometer slide gauge in centre, which is fully divided, name engraved, and number stamped, both on the scale and on the micrometer nut. It has all the appearance of being hardened on the measuring surfaces, and is nicely finished; a $\frac{1}{2}$″ screw micrometer (top left) engraved, number stamped, and knurled as the other; a set of 3/32″ stamps in figure type (top right), and a set of 1/16″ stamps in alphabet type (bottom right) made by the competitor, and seemingly used to stamp the other tools exhibited; a ratchet-brace (bottom left); and a hand vice (top centre). All are regular finish and hardened on necessary surfaces. This exhibit, which is one of the best of its kind seen in our shows, received a well earned "Very Highly Commended." They are made by an engineer fitter to his own design, and who possesses a home made workshop, with $3\frac{1}{2}$″ gap S.C. lathe, and a fair tool



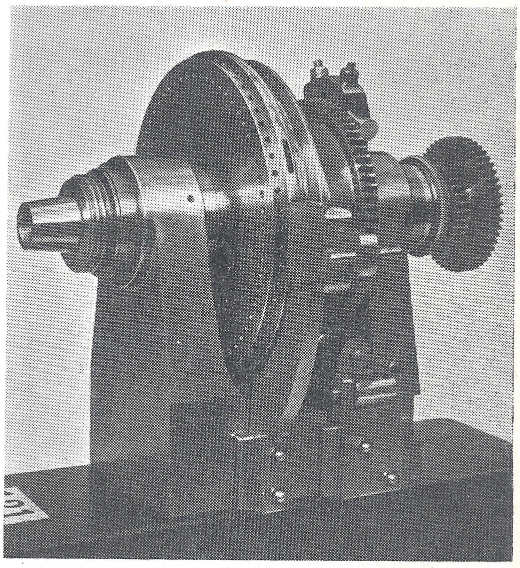
A group of hand made tools by Mr. E. B. Wilcox.

equipment. He exhibited a model engine in another section of the competition, which received a high award. The next one which claims our attention is Mr. C. J. Groom's headstock for a 3" lathe, which comes under "Parts of a Lathe." It is illustrated by two photos, the first showing it at the front, and the second at back. Mr. Groom, who is a trained mechanical engineer, made and exhibited the lathe for which this headstock is a replacement, some three years back, and gained a high award on that occasion. The award



Mr. C. J. Groom's 3" Headstock for a Complex Turning Lathe.

gained in this case is "Very Highly Commended," and which no doubt would have been higher had it been quite complete, the internal gears not being in. The stock of head is in cast gunmetal from Mr. Groom's patterns, and is finished bright all over; the machining to it was done on its own lathe, which is the only lathe used by Mr. Groom in his back room workshop. Looking at the front view, is seen the operating wheel of the worm tangent gear, the worm of which can be lowered out of gear, to which it is lifted by the knurled nut seen below, and secured to gear by the knurled screw head seen to left. This gear can be drive operated by a pulley put on its extension, seen at the back. In order to operate the gear circularly reciprocative, a number of tapped holes are put in the worm wheel (which is fixed to mandrel). Into any of these, side and side, is screwed a stop screw, which, acting against adjustable stops set tangently on top of the tail bearing, allows of fixing a positive stop at each end in end milling a circular arc slot, or edge, on work chucked in the lathe. The bearings are opposed double cones, hardened "tool steel" on mandrel, running in manganese bronze bushes in stock. An interesting feature is the idea of an internal epicyclic reducing gear, which (looking at the back view) is carried by a steel plate lying between the mandrel wheel on the outside, and the loose cone pulley on the inside. In order to operate the gear, the steel plate, which is normally loose on the mandrel, has to be locked; and to effect this, a slot is made in its edge, which is keyed by a sliding key tongue, held in the arm at back. When so locked, a pinion on the nose of the cone, operating through the fixed position gear on the plate, drives an annular wheel inside the mandrel wheel on outside. In single gear running the plate is set free, and both it and the cone are locked to the mandrel wheel by a locking device at tail end. The arm in front (see front view) carries a sliding index pin, which operates in the 60 circle on edge of mandrel wheel for direct dividing. Check counting is carried out by a similar number of tapped holes put in the face of mandrel wheel. Before dividing, the respective holes to be used for a given division are plugged with a set screw and carefully checked. Then the indexing being done on these holes only, obviates chance of error in counting. Mr. Groom has a somewhat similar lock check on the mandrel cone adjustment at tail. Here a knurled adjusting nut is set exactly and locked by screws in the same manner. Finally, the mandrel itself is as original as all the rest. It is bored throughout to take a hollow draw spindle for standard split chucks fitted inside the extreme of the nose, the outside of which is made taper. backed by a shallow depth screwed nose of larger diameter; chucks are adapted to this, so that, while secured by this nose screw, they bear only on the taper, and neither on the taper shoulder nor that of the screw. Altogether Mr. Groom has produced a lathe part entirely his own design, which is both original as well as



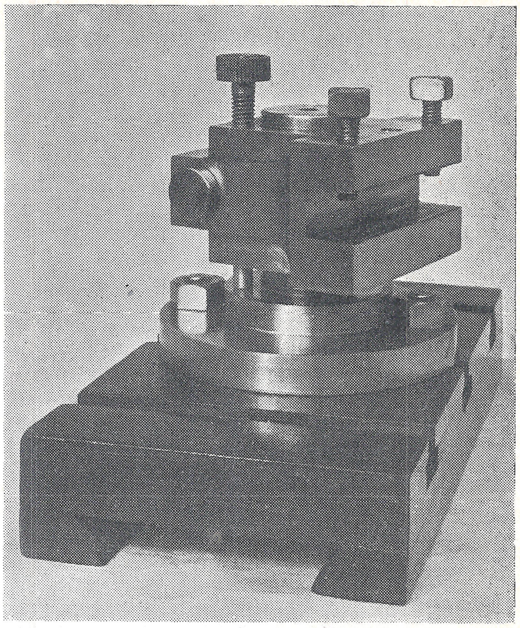
Mr. C. J. Groom's 3" Lathe Head, Rear View.

extremely clever. In addition, the workmanship is above reproach.

The next in order of interest is Mr. F. A. Leete's lathe tool holder, as illustrated here. It was described, with drawings, in a Workshop Hint on page 276 of Vol. LXX of the "M.E." (March 22, 1934, issue). As recorded there, it is constructed in solid mild steel in two pieces, the base and column one, and the clamping

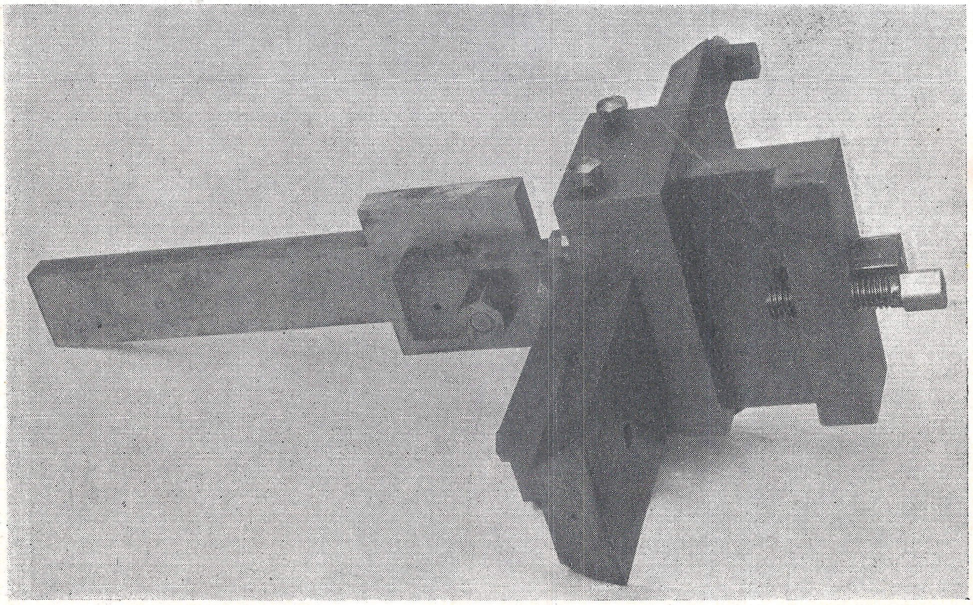
block; and is very nicely finished. Its principal interest here is that it was adjudged as meeting the requirements of the "Barker" prize, offered by Mr. G. W. Barker of Lowestoft and the Norwich Society, which laid down that it was to be a useful tool or apparatus for the model engineer's workshop, showing originality, and of materials costing not more than 10/-. According to Mr. Barker, preference should be given to something described, or suitable to be described in the "Model Engineer," in such way that others could make it. This met the case admirably, and it was awarded in conjunction "Very Highly Commended." Mr. Leete took the trouble to mount it on a polished mahogany model of a slotted slide saddle, in order to show its adaptability. The idea of it is familiar, but its method of fine adjustment for height is original, and is the "all in all" of an otherwise delightfully simple contrivance. Mr. Leete is retired from service in India, and has had no technical training in lathe work.

The above was closely run up by the next item we have to show, which is Mr. H. E. Walker's vertical slide for grinding lathe tools. This is a long vertical slide mounted by swivel on a flat shank for tool clamp attachment. The tool carrying saddle is hand operated on its slide. A point is that in construction, where a swivelling protractor should be fitted, Mr. Walker has drilled certain holes, one of which, on the swivel, is opposite the slide, and tallies, with slide at zero position, with another hole in the shank plate, so to set, by means of a pin, to zero. Mr. Walker explains that, being unfortunately partly blind, he could not set it to a scale, so has drilled register holes either side of zero to give 5°, 12°, 55° and 85°. Similarly the tool holder has similar holes to give front clearances of 2½°, 5° and 10°. Mr. Walker uses this ingenious tool on an old lathe bed equipped with a grinding wheel head. The shank plate is of mild steel, and the remainder of cast iron from castings made from the maker's own patterns. It was awarded "Commended," which was somewhat low for an original design.



Mr. F. A. Leete's Lathe Tool Holder, with fine adjustment for height.

The final apparatus we have to show by pictures was Mr. Penruddocke's bracket with vertical spindle for lathe attachment, and operated by mitre gear taking its drive from the lathe spindle by the mitre half, seen to the left, which takes its drive in turn by a Morse taper secured by a draw stud through the hollow mandrel of lathe. With this, there were certain taper shank lathe arbors and collet chucks, also made by the exhibitor. One of these, a crotch centre for tailstock use, is seen in the picture. A point about the bracket, which is, as seen, secured to the vee and flat bed, and is intended mainly for gear cutting



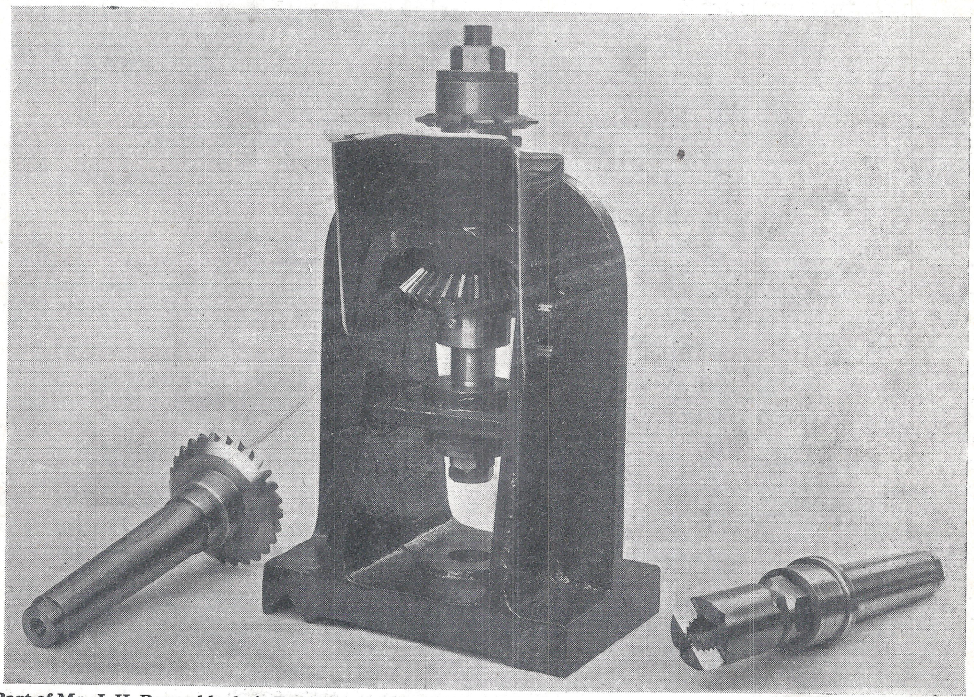
Mr. H. E. Walker's Vertical Swivelling Slide for Grinding Lathe Tools.

(like a similar fixture designed and made by the late Geo. Adams for his precision lathes) is that it is carefully hooded about the gears on the front, top and sides, and therefore suggests a factory used tool. It was awarded again only a "Commended."

The other tools, which call for notice, in the higher award list were Mr. W. L. Rowson's sensitive lever feed high speed bench drilling machine, which was to his own design, and was awarded "V.H.C." with the "Forster" prize for originality in design and construction. This was a nicely made machine tool, commendable for provision of all possible table adjustments, with graduated scales, and remarkable flexibility in the drive adjustments.

Mr. L. G. Shepherd, of Banbury, who is a press tool setter, secured a V.H.C. and the "Hands" prize, which has for its object the recognition of a model or apparatus likely to be of commercial value, for his original design of a self acting machine for trimming aluminium circles. Mr. Shepherd has an outlet for his tool setting capacities in works devoted to press work in aluminium and its alloys. In pressing out discs and the like, it is necessary to remove the punching burr around the leaving edge of punched discs. This, if effected by hand, becomes a relatively tedious and time taking operation. The little machine receives the burred discs in a feed column, and carries them against a circular cutter which rapidly removes the burr and discharges the finished discs into a receptacle below. Although shown for hand operating, it is typical of production tools as a whole, and is a monument to the interest in productive capacity, by a mechanic, who gets his living by the constant correction of similar machines. This attribute of inventive capacity practically applied to one's daily occupation is uncommon, and shows enterprise out of the ordinary, and the award given appears to be very appropriate.

The final "V.H.C." award was given to the only double exhibit under one name, and that was Mr. R. H. Warburton of Macclesfield, who exhibited a dividing head attachment for the lathe, followed by an exhibit of collet chucks adapted to a given type of a well-known make of lathe. The award comprehended both exhibits. The dividing attachment is of the most interest. It is a modified design founded on Mr. G. H. Walters' "Dividing Head Attachment," as described, with drawings, in the "M.E." on pages 603 to 609 of Vol. 62 (June 26th, 1930 issue). Mainly modified in the point that it is made adaptable to the mandrel tail of a lathe, rather than to the nose. The division plate is drilled with 3 rows: 27, 36 and 45, instead of the one only of 27 used in the original, and the micrometer is fitted on the secondary worm spindle capable of adjustment to zero. The index pin is made to withdraw permanently for convenience in moving to register. A tip occurs here of a simple character, in that the maker of this contrivance, in knurling certain small heads, mounted and used the flint wheel out of an old petrol lighter as a knurl wheel (readers please note). It is perhaps a pity that, like the original writer on the subject, this maker got "a friend" to hob the main 40 tooth worm wheel (one of the key jobs of the making). Assuming this "friend" not to be of the order "professional" in gear cutting, why didn't he rope him in as joint constructor? This must have told with the judges, for the job as a whole is worth more than the award. Again, res-



Part of Mr. J. H. Penruddocke's Exhibit. A Mitre-driven Vertical Milling Spindle Bracket and a Crotch Centre.

pecting the 90 tooth wheel, it is left to the judges' assumption that he hobbed this worm as described in the original, and judges notoriously look on the black side and assume he didn't. In any case, it is an excellent job, and well worth its award and, although something rather special from the model engineer's point of view, is excellent tool work.

Curiously the awards carrying away "H.C." to their credit, three in number, were all either lathe milling attachments or accessory thereto, as the vertical slide made and exhibited by Mr. R. V. Fletcher. The two other competitors with this distinction were Mr. D. E. Glass, and Mr. R. C. G. Hancock, who included with his compound exhibit a spray gun for painting, one of the three handtool entries. The third was given "Commended," and described as a Starrett pattern scribing block, by Mr. G. A. Rogers.

The remaining "Commendeds" were a miniature sensitive drilling machine by Mr. H. C. Taylor; a power bench drilling machine by Mr. L. A. Watson; and a top slide to fit the cross slide of a "Wade" lathe, by Mr. W. H. B. Wheeler.

It is significant that while only one exhibit of this group did not turn up, only one received no award, out of all the others, and tool making modellers may take some encouragement from the fact that the judges thought so well of the efforts. It is at any rate a tip to all so concerned to make this group still better, and come along strong again next time.

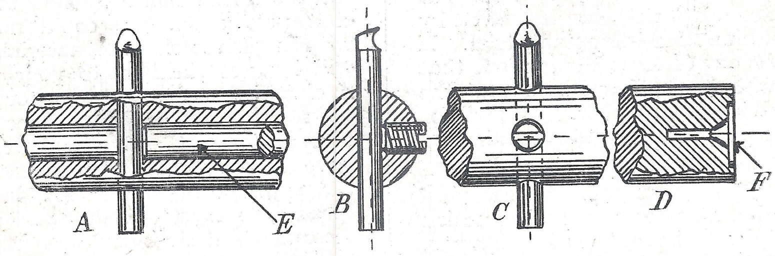
First Steps in Model Engineering.

Workshop Advice, Experience and Philosophy for Readers of all Ages.

By "INCHOMETER."

Opinion about the Dunleavy Boring Bar.

A prompt response to my preference for expert opinion regarding Mr. A. G. Dunleavy's boring bar, illustrated in "First Steps" of November 28th, has arrived by letter and sketches, from a mechancial engineer and specialist in tool work and gauge making. My correspondent, Mr. J. H. Davis, of Wembley, is evidently carrying on a business in this class of work, I am particularly obliged to him for his clearly and kindly expressed views and neat drawings. The letter is a well compiled exposition of the various aspects involved; I have enjoyed it, and would like to publish the entire argument as set forth by Mr. Davis, but doubt if you would favour that occupation of so much space. The opinions given are as follows: they are by comparison with an supported throughout its shank by solid metal. (2) The Dunleavy bar must be removed for the cutter to be adjusted to take different and successive depths of cut; this will be tedious when boring to exact diameter. (3) The same drawback applies when the cutter requires to be taken out for resharpening. (4) Running a bar between centres for boring and facing is a weak method of support for accurate work, even with a solid bar, but with screws in the end of a bar, that can only be tightened on the small pins which hold the cutters, chatter will possibly arise, and inaccurate work result. (5) The centres in the boring bar must be truly in line to obtain maximum support from the lathe centres; this can only be assured by a solid bar. I think the screws should be a nice fit on both the plain part and the thread, but



Illustrating comments by Mr. J. H. Davis concerning a solid boring bar and the Dunleavy hollow bar illustrated in November 28th issue E distance piece, F recess for protecting centre.

ordinary solid bar. (1) The method of fixing the cutters is no improvement over the ordinary set screw, it involves weakness in the whole bar. The bar locking arrangement, owing to the hole, does not offer any support to the cutter against the pressure exerted by the locking screw, either when pressing direct upon the cutter or through a distance piece, as explained by sketches A, B and C, where E is a distance piece. This lack of support results in tendency for the pressure to bend the cutter, particularly a cutter of high speed steel may crack. With the set screw design as shown in B and C, solid bar, the cutter is however nicely they may be made and fitted, there is always a possibility of wear putting the centres out of line. Screws canting and thus causing the bar to run out of truth. This is not detrimental, except that the centres will not have a correct bearing, the cutter will either bore a hole smaller or larger than intended according to the way it is bent. That is, the hole bored will be round and parallel, but may not be the size desired. "There is a question about driving the bar; the carrier should be fastened upon the bar and not upon the screw plug." A warning, also, to make sure that both screws are tight home

before putting the bar between centres, to minimise chance of them loosening whilst the hole is being bored. (6) A suggestion that the holes at the centre points should be deep, about half an inch, for holding more oil. He objects that this is not practicable if tommy holes are used. (7) Another suggestion is to have a recess, shown at F in sketch D, in each plug for protection of the centre hole.

Comments upon these Observations.

Referring to Mr. Davis's opinions and advice as numbered in the foregoing paragraph. (1) Locking the cutter as indicated by sketches B and C may be troublesome and irritating with a bar of small diameter. If the bar is of large diameter, there is enough metal to provide adequate length for the set screw to hold into, also, the screw may be substantial and strong to withstand tightening pressure and afford a good grip for a screwdriver. There is some tendency for the screw, as it is rotated in tightening, to move the cutter, and thus interfere with adjusting to boring size. From my own experience, I can endorse the comment about high speed steel, if it is not fully supported against pinching stress in a tool holder or bar. (2 and 3) The cutter may be released without necessity of taking out the bar. If the tailstock centre be slightly withdrawn, the end plugs can be unscrewed; a very slight amount of unscrewing will release the cutter. Adjustment of the cutter would probably be at least as convenient to effect as by manipulation of a set screw in the side of the bar. Set screws are, at times, quite a nuisance, especially if one happens to break off in the hole. (4) Correct in general, it is, however, frequent practice and is serviceable. (5) Good advice, should be kept in mind. (6) Instead of tommy holes, the plugs may have flats to receive a spanner. (7) Very practical advice, centres of boring bars and of mandrels are likely to become bruised through careless treatment. Doubt as to strength of the bar and stiffness, also chattering, can be solved by Mr. Dunleavy himself with actual trial. If you should make one of these bars, I hope that someone else will do so, I am sure that the remarks and advice given by Mr. Davis will be a valuable assistance to your understanding.

Fireside Fancies and Conceits

Grant to me indulgence, at this season of goodwill and relaxation from normal direction of efforts, to set down thoughts as they happen, inspired by a mental peering into the glowing coals in my study hearth. A fancy which comes along is Mr. W. L. Blaney's "Law of Balance," mentioned in one of my former articles, everything is balanced in some way or other, immediately or in due time. Because a thing is not perfect, has objections, maybe only through opinion or surmise, it is not necessarily valueless. The Dunleavy boring bar, from the criticism one might conclude that it is not worth making, that a solid bar is preferable, both for working and manipulation, and is easier to make. But Mr. Davis, does not mean this, his letter commences thus "While such efforts to improve ordinary simple tools are very commendable and are good practice, I will endeavour to show in this case what I consider to be its weak and undesirable points compared with an ordinary boring bar." Here is a friendly pat on the shoulder for you from a professional mechanic, whether you care to make one of these bars, any appliance, or model. This friendly sentence ameliorates his criticisms, it causes me to highly value his response and views. Keeping in mind the "law of balance," endeavour to see and recognise first all merit, advantage and good features of whatsoever may come your way or be in your possession. This is preferable and generally a happier plan than seizing immediately upon drawbacks, faults, and lackings. It will apply to your workshop, tools and equipment, makings, surroundings, circumstances, and to yourself. If you feel poor, schedule your possessions, including health, and ability. You may be unskilful, timid and hesitating, your kit of tools meagre, but there is surely in your characteristics some merit of which you can be proud, awaiting opportunity and will to fulfil the law of balance. Hang on to your possessions and good qualities, have faith in these, see and use them to good and generous advantage.

Cutting Speeds for Metals.

When you are considering about the cutting speed to impart when turning, planing or drilling, you should recognize that it will depend upon the nature of the particular sample of material being cut. There are established data applying in general to steel, wrought and cast iron, copper, brass and so on, regarded as a certain classified material, but you will require to accept the figures with some reservation. At an exhibition of machine tools, there was an automatic machine turning spindles, adapted for clock and instrument construction, completely finished from steel rod. Being doubtful if the machine was producing at the rate claimed on the notice card, I made enquiry of the attendant. He informed me the notice figure applied to French steel, that production rate could not be attained with English steel as the material. This example will impress the idea to your understanding. A classified material, brass, for instance, may be soft, hard, or tough, according to the composition of the alloy and treatment it may have been subjected to during manufacture. Be prepared to qualify set data for cutting speed according to your own experience, and ascertained desirability obtaining with the particular specimen.

Grates for Model Boilers.

Having to make a small fire grate to complete a boiler, I was not relishing the idea of boring and parting off the necessary spacing washers to go between the firebars, when I spotted a piece of discarded cycle chain. There I found just the thing I wanted, the rollers being one-eighth of an inch wide—the size most usually employed for this purpose. The pins were punched out between the vice jaws in a very short time, and besides the washers, I have a supply of hardened collars, 7/32" long and 5/32" bore on which the rollers ran in the chain. These will come in useful some time.

R. D. QUILLIAM.

LOCO. PROTOTYPES NEWS and NOTES

By CHAS. S. LAKE, A.M.I.Mech.E., M.Inst.L.E.

An American Locomotive Contrast.

The accompanying illustration shows the new streamlined express locomotive of the New York Central named "Commodore Vanderbilt" with alongside it the "De Witt Clinton," which was the first locomotive operated in the state of New York. This small four-wheeled engine was first run in the year 1831, whilst the high powered streamlined locomotive was first placed on the tracks in December, 1934. The length of the latter, overall, is 96 ft., whilst that of the smaller engine and tender is 23 ft. 9 in. The "Commodore Vanderbilt" weighs 228 tons, and the "De Witt Clinton" 7½ tons.

Answers to Correspondents.

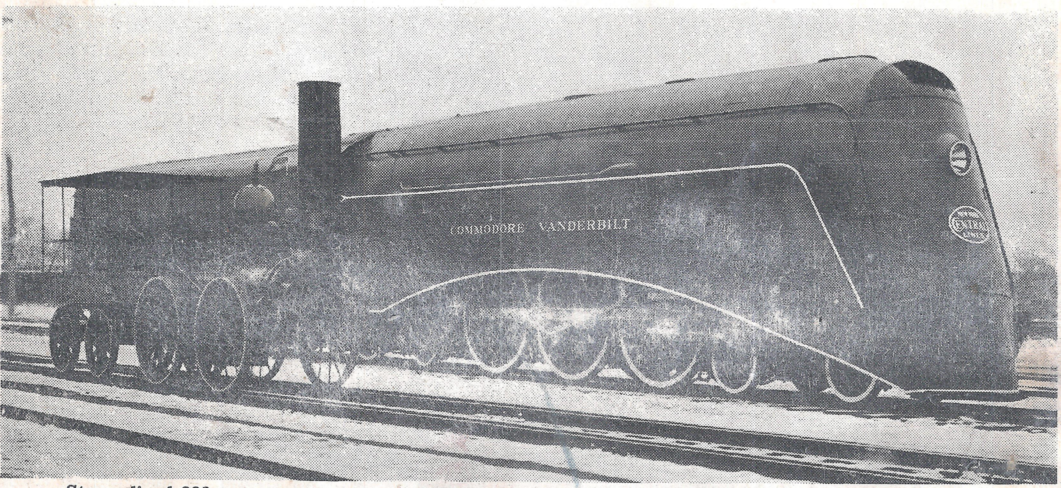
The writer has been asked by a correspondent to explain the principal advantages of the tapered as compared with the parallel forms of boiler barrels for locomotives. This correspondent has been much impressed by what he calls the "wholesale adoption" on the London, Midland & Scottish Railway of tapered boilers, which previously was mainly restricted to the Great Western Railway, although commonly used abroad. This enquiry also raises the question of the relative cost of building the two forms of boiler barrels.

The main object in utilising the conical or tapered form of boiler barrel is that of securing the maximum cross sectional area at the point nearest to the firebox where, of course, the value of the heat is greatest, whilst at the same time providing the maximum water and steam space above the tubes, and rendering water circulation easier. It is contended that the front portion of the boiler, especially where the distance between the tube plates is increased, owing to the wheel arrangement or for other reasons, is to some large extent ineffective from the point of view of heating surface, and although the principal cure for this is, of course, that of reducing the length of the tubes by recessing the smokebox or providing a combustion chamber, it is also associated with the actual form of the boiler barrel itself.

The argument that the taper boiler reduces weight is not always a very conclusive one, as if the mean diameter be taken and compared with the telescopic or parallel boiler, much the same result follows. On the other hand, there does seem to be something in the point that with a sloping boiler, the driver's outlook is in certain circumstances improved, whilst another claim, in the writer's view, a somewhat dubious one, is that owing to the tapered formation behind the chimney, an improvement in smoke lifting is brought about, owing to the freer circulation of air in the wedge shaped formation at the rear of the chimney.

With regard to cost, the taper boiler in its inception was more expensive, for the reason that new plant of a different kind had to be laid down for rolling the plates to shape, and it is possible that the cost is permanently somewhat greater than in the case of parallel boiler sections. Once the initial cost is got over however, it is doubtful whether there is much in this. Thus, when summed up, it would seem that the main feature of the taper boiler which redounds to its credit is the larger spaces afforded at the firebox end, so that the maximum advantage can be taken of the heat transmission values there. In some cases, the boiler is tapered both top and bottom, but in others only at the top or below.

If any reader has further views on the subject of tapered boilers, and claims to make on behalf of them, it would be interesting to know what they are.



Streamlined 228-ton express engine of 1934 and alongside it the "De Witt Clinton" (7½ tons) of 1831.

Another correspondent asks for information regarding the effect produced upon locomotives when exceptionally high speeds are consistently maintained, as in the case of the "Silver Jubilee" train on the London & North Eastern Railway, and numerous others at home and abroad. A lot, of course, depends upon the suitability of the locomotive for its task, and the condition in which it is maintained, but assuming both of these factors to be correct, then very fast running with train loads well within the power of the engine does not, or should not, bring about rapid deterioration or excessive wear in the parts of the locomotive.

One of the principal problems is, of course, that of lubrication, for naturally all high speed machinery requires to be adequately lubricated throughout the whole time it is working. Not only the measures for feeding oil (where possible under pressure) to the moving parts, but also the character of the lubricant itself is of the highest importance, and considerable thought has to be given to this point when engines are being placed in services which demand exceptionally fast running. On the Continent especially, types of axleboxes in which the oil is picked up and thrown over the surfaces to be lubricated by mechanism consisting of rotating blades, are freely used, and there is nowadays an increasing tendency to employ anti-friction, i.e. roller bearings, whilst on several railways, grease lubrication for rods and other parts are being introduced. Generally speaking, however, a good quality oil fed under pressure to the cylinders, piston valves and main bearings is the medium relied upon for keeping the parts at reasonable temperatures, although working at very high speeds for long periods at a time.

Model Aeronautics.

"Backlash II," A Tandem Screw Monoplane.

By P. N. DELVES-BROUGHTON.

A SINGLE screw aeroplane, either of the tractor or pusher type, is greatly affected by propeller torque. To counteract this torque, opposite rudder and aileron must be applied, or a circular flight will result. Two propellers,

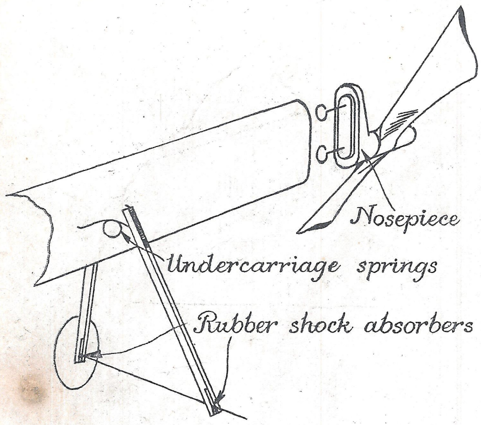


Fig. 1.

however, turning in opposite directions, balance each other's torque, and long straight flights can be obtained.

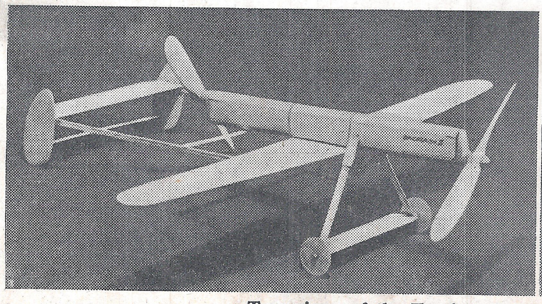
The model illustrated is the "Backlash II," a monoplane with two airscrews arranged in tandem. The wing span is 19 inches, and the overall length 16½ inches. The model, in flying trim, weighs ⅞ ozs., giving a wing loading of 3.78 ozs. per square foot.

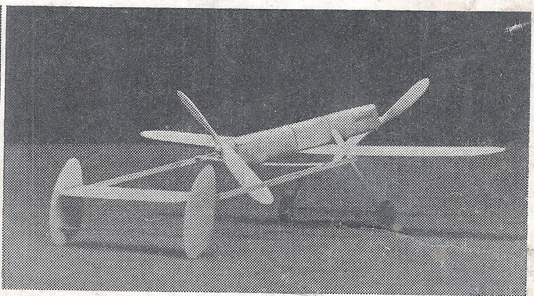
The fuselage is built of balsa, and consists of four 1/16″ × 1/16″ balsa longerons, supported by 6 balsa formers. The fuselage framework is covered with 1/32 inch balsa sheet. Two tubes of rolled paper are inserted through the centre of the fuselage, to form bearings for the undercarriage.

The undercarriage is secured to the fuselage by steel wire springs, and the undercarriage legs are made of bamboo streamlined off with balsa. The wheel axle is held in slots in the legs by rubber bands, which act as shock absorbers (Fig. 1), and the wheels are made of 1/32 inch three ply, faced with 1/16 inch balsa. A piece of brass tubing forms the bearing.

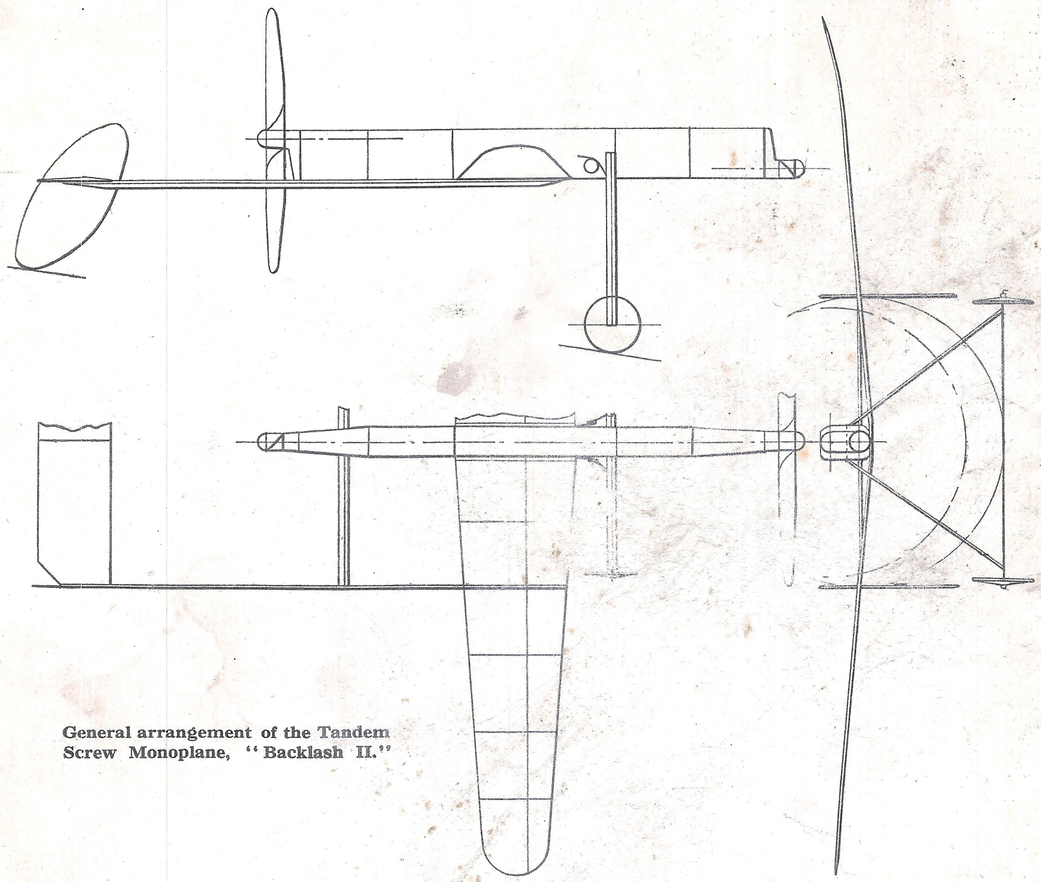
The propeller blocks are made of balsa, and are shaped to streamline off the nose and tail of the fuselage. A three ply block is glued to the back of each, so that it fits into a slot cut in the first and last formers of the fuselage.

A length of brass tubing is inserted in each, to form a propeller shaft bearing. The rear





Two views of the Tandem Screw Monoplane "Backlash II."



General arrangement of the Tandem Screw Monoplane, "Backlash II."

propeller is 5½ inches in diameter, while the tractor screw is 6 inches in diameter. Steel hooks, one at the bottom of the rear propeller block, and one at the top of the front propeller block, take the rubber motor (Figs. 1 and 2).

The wing, which tapers from 2½ inches to 1½ inches wide, is built of 1/16 inch × ⅛ inch leading and trailing edges, with the main span of ⅛" × 3/16" balsa wood.

The wing ribs, which are of the "Clark Y" section, are spaced 1½" apart, and the wing tips are made of 1/16" sheet balsa. The wing is covered with jap paper. Tail plane and

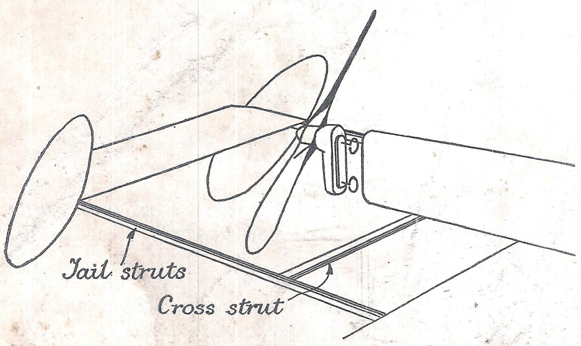


Fig. 2.

rudders are shaped from 1/16" sheet balsa, and are supported by two struts cemented to the wings. These tail struts are made of 1/16" × 1/16" birch, strengthened by 1/16" × ⅛" balsa, which is cemented to its lower edge. (See Fig. 2.)

A cross strut 6 inches long strengthens the structure. The whole surface of the model is coated with aluminium dope. Two rubber motors, each consisting of four strands of 3/32" × 3/32" rubber, supply the motive power. The original model could, after a short run, take off under its own power with either of the propellers out of action.

Correspondence.

Model Petrol Plane Records.

Dear Sir,—Your correspondent "Gee Bee" raises an interesting subject in connection with duration records for petrol model aeroplanes on p. 527 of the "M.E." when describing Mr. A. E. Brooks' recent very fine flight.

The present rule that prevents the timekeepers moving from the starting point certainly does only prove that the model is capable of a normal but good and reliable flight, and little else.

At the time when I put up the existing record of 12 minutes 45 secs. (out of sight), there were not many models capable of doing that, but now there are many models capable of that time and considerably more, and in fact, several flights of a greater duration have actually been made.

It, therefore, now boils down to the fact that a duration record made by a petrol model under British rules is merely a certificate of reliability

and a record of the timekeepers' eyesight! This is not a very satisfactory state of affairs.

"Gee Bee" says in his letter, "The sting of the report comes in the tail, however, as though the model made such a performance, no record can be claimed."

But this cuts both ways, for on the occasion upon which my model set up the record, it also disappeared into the clouds, and a friend and myself followed it in a car for over 20 minutes before we actually completely lost sight of the model, and this was on quite a small amount of fuel in the model's tank. So the record does not give a true indication of the actual time flown, or capable of being flown.

I have advocated on several occasions, that the rule in question should be revised, but have met with opposition, chiefly on account of the fact that it is felt that as not all model owners possess a car, it is unfair on those who have no car, that some should be able to stage a chase across country with the timekeepers.

This, however, seems to be getting away from the essential point that *a duration record is to find out how long a petrol model can be induced to fly*.

In full sized events, personal questions like these are not taken into consideration, and furthermore, I am convinced that there would never be any difficulty for a non-car owner to obtain the services of a fellow enthusiast with a car. I, for one, would always be only too glad to travel a long way to any official attempt on the record, in order to make the use of my car available.

But there is another reason against any alteration of the rule that I have been so far unable to find a satisfactory answer to. And this is on the score of danger—a petrol model let loose is a definite danger amongst clouds to full sized aircraft, and also to the unfortunate unsuspecting pedestrian, should it glide quickly down upon his head from out of the blue, and miles away from the starting point.

This last point has led me temporarily to abandon my attempts to have the offending rule amended, as I cannot think of the correct answer.

We do not want the petrol model to be forbidden in England, and I consider it behoves every enthusiast to be most careful that he has some reliable timing device on his model that will regulate the duration of flight to "safe country." In the past and early days, I confess I have lost my models on several occasions and found them miles away, but I now fully appreciate the risks, both to individuals and the sport in general, especially in view of the increasing numbers of petrol models, and I carefully regulate the duration of my flights.

It is certainly an unhappy thing to think that the Americans can lead us easily on this duration business, because they have such large open tracts of country.

It would be interesting to hear readers' views on the whole subject, and out of it some solution or suitable piece of country for record attempts might be found, where the actual maximum duration of flight might be attempted, and the timekeepers expected to take some real exercise.

At present, unless a very calm day is found, it is difficult to keep a model in sight for more than the present record time.

If someone does find a nice calm day and a slow flying model that will hang about, he may add a few minutes. Under the existing rules, some one else will have to wait for a still calmer day and try to beat him. It certainly does seem absurd.

But I would remind petrol enthusiasts that there are several new fields in which the petrol model may be developed and records set up. The speed model, the autogiro, and the seaplane have all been neglected as far as petrol goes.

Mr. Brooks is to be congratulated on his very fine flight. I am not surprised at it, however, as I have tested one of his "Comet" engines on the bench and seen him fly his model. They are both most convincing and reliable performers, and of robust yet reasonable light construction, which to my mind is the most important requirement of a petrol model to be used in English weather.

Yours truly,

Birmingham. C. E. BOWDEN, Capt.

The Park Model Aircraft League.

A most enjoyable evening was spent by a party of 36 members and their guests on the occasion of the first Annual Dinner of The Park Model Aircraft League, which took place at the Bedford Hotel, Balham, on Wednesday, December 4th last.

The guests were received by Mr. F. J. Saul, the President of the League, who presided at the Dinner. There was a brief toast list after the excellent dinner had been served. The prize-giving then followed, the prizes being presented to the winners by Miss Saul, the more important Trophies going to the following members :—

Shanley Trophy and Silver Medal to Mr. F. H. Dillistone, of Clapham.

Bronze Medal to Runner-up, Mr. K. W. Hetzel, of Clapham.

Duration Trophy, for the second time, to Mr. R. T. S. Gillett, of Mitcham.

York Trophy to Mr. G. Mogford, of Mitcham.

The Record Trophy to Mr. H. W. Babb of Twickenham.

The S.M.A.E. Medal, awarded for the most meritorious performance, to Mr. H. W. Babb.

All the prizes and trophies were on show, there being some 20 different awards to compete for.

Contributions to the enjoyable entertainment, with which the evening was brought to a close, were made by Mr. A. Marks, Mr. H. W. King and Mr. D. H. May. Mr. H. W. King acted as M.C.

The Second Annual Dance and Exhibition of Models will be held on Wednesday, January 29th next at the Farnan Hall, Streatham.

Hon. Secretary, F. H. DILLISTONE, 112, Rodenhurst Road, Clapham Park, S.W.4.

QUERIES and REPLIES

6,796.—Railway Track Curves.—H.J.P. (East Dulwich).

Q.—Could you tell me the radius of the most acute track curve a locomotive of the G.W.R. "Castle" class can take in actual practice?

A.—The usual minimum curve for an express engine is five or six chains radius, but in stations, there are often 7½ chain curves. In loco. yards, etc., the care bestowed on track accuracy is less than on the main running lines, and quite a little extra play in the gauge will enable a locomotive to squeeze round a sharp curve. At Salisbury, where the L.S.W.R. boat train came off the road in 1906, the offending curve was 10 chains (660 ft.) radius, and the speed reduction—evidently not observed—was 30 miles per hour. There were some points laid on a 7½ chain radius in this station.

6,833.—Running Model Electric Railway from Mains.—J.T.F. (Abergavenny).

Q.—I have a model electric railway which is now operated from a 4 volt battery; could the railway be operated by some means from the main electric supply? Is there a cheap method of doing this? Our local supply is a.c. 230 volts, 50 cycles.

A.—It is possible to run your railway from the a.c. mains, but the method of doing so will depend on the type of motor fitted to the locomotives. If these have wound and laminated fields, they will run on a.c., reduced to the required voltage by means of a transformer only, though reversing from the track will not be possible, unless a special form of reversing switch is fitted to the locomotive. On the other hand, if the motors have permanent magnet fields, they will only run on direct current, and thus the a.c. mains supply must not only be transformed, but also rectified. A complete self-contained power unit for this purpose, incorporating transformer, rectifier, and reversing speed regulator, is supplied by Shenphone Electrical Products, 226, High Road, Leytonstone, London, E.10.

6,827.—Making Piston Rings.—A.F.B. (Bath).

Q.—Could you tell me the processes for making piston rings, and also give me the names of any firms who would make piston rings of special design?

A.—There are many patented processes for piston ring production, some of which involve hammering to a determined free contour, or stressing to increase the elasticity, but the most common method is as follows:—

The ring is first turned oversize, both inside and out, and slightly thicker than required; it is then faced and parted off, and the back face machined truly to even and correct width. The ring is then cut, and sufficient metal removed at the gap to give the required elasticity. It is then compressed to close the gap, and mounted on a mandrel by collars which grip the side faces and hold it in the closed position, after which it is ground or otherwise machined to the size of the cylinder bore. In some cases the mandrel is run slightly eccentric, so that the ring is thinnest at the gap, but concentric rings are now preferred. Generally speaking, the difficulty of producing successful rings with amateur equipment is hardly worth while, in view of the fact that excellent rings are made to any required size by specialists, at quite reasonable cost. We can strongly recommend Wellworthy, Ltd., Radial Works, Lymington, Hants., for this class of work.

6,771.—Lathe Speeds for Turning.—A.J.P. (Alton).

Q.—I have a small 3″ centre lathe, back geared, and a ½ h.p. electric motor, which runs at a speed of 2,800 revs. per minute. Could you please tell me at what speeds the headstock spindle should run for cast iron, mild steel and brass, and what sized pulley I shall need on the counter-shaft?

A.—Presumably the cone on counter-shaft is a replica of that on the lathe, and set in opposition (i.e., large to small one end, 1 to 1 in middle, and small to large at the other end). The mean single speed of your lathe should be about 300 r.p.m., and this, being the mid belt gear of the counter-shaft, becomes the continuous speed of it. If this is so, the gear down is 2,800 to 300, or say 9 to 1.

You cannot, therefore, directly drive the counter-shaft from the motor. If, say, the smallest size pulley you can put on motor is 2″, the counter-shaft fast and loose become 18″, which, we think, will not go in. Put an intermediate shaft with 9″ pulley on it, getting thus 9 to 2 = 4½ to 1 down. This is opposite the motor. Then put a 3″ broad pulley on intermediate, driving 6″ fast and loose on counter-shaft, getting 2 to 1 down further. Thus 4½ × 2 = 9 to 1 down, and so the mean speed of lathe will be $\frac{2800}{9}$ = 311 r.p.m. as a result.

Business Enquiries and Replies.

Centrifugal Pumps.

Q.—Can you furnish the names of any firms, other than those mentioned in your previous reply, who manufacture small electrically driven centrifugal pumps for garden fountains?

A.—Messrs. Leslie Dixon and Co., 218, Upper Thames Street, London, E.C.4.

(Wilmslow, 873A).

Universal Ball Joints.

Q.—Would you please give me the addresses of a few makers and suppliers of Universal Ball Joints?

A.—Gregory & Sutcliffe, Viaduct Street, Huddersfield; L. B. McDonald Ltd., 81, Bunhill Row, E.C.1.

(W. Holloway, 874.)

PRACTICAL LETTERS from OUR READERS

Model Loco. Standards of Performance.

DEAR SIR,—I am pleased to see that this discussion is still arousing interest, but unfortunately, some readers seem to be singularly misinformed as to both the methods employed, and the data which can be derived from a brake test. I would like to remind them that I did not, in the first place, insist on the necessity for brake testing, but since the argument chiefly centres round this matter, I am prepared to defend the case for it against all comers.

Actually, a brake test can be conducted just simply and solely for measuring the maximum power which a power plant can produce. As such, it is well worth while; but the function of the testing plant can readily be extended to cover a much wider field, and such tests as flexibility, overall heat efficiency, fuel and water consumption, and mechanical efficiency can be readily carried out without the addition of very complicated appliances or instruments. Of course, the number of testing instruments which could be applied is unlimited, but my idea was not to turn the bench into a complete physical laboratory; just to use it for the purpose of ascertaining vital and material facts, which can be directly applied to improving design, or at the very least, to recording definitely what is already achieved in practice.

I refuse to be side-tracked by the red herring which Mr. Bewan Springer persistently keeps dragging across the trail. On a future occasion, I should be very pleased to have a friendly tilt with him on the respective merits of steam and I.C. engines, but let us settle one argument at a time, please. I would like to again assure him that a low speed steam engine is, really and truly, a far easier thing to test than a temperamental high-speed I.C. engine. This is from practical experience with both types, and I hope he will take my word for it.

What is a Locomotive Built for?

This staggering question has been raised in more than one quarter, and I suppose, after receiving such a crushing blow as implied by the obvious answer thereto, poor old "B.H.P." is expected to steal away and jump under the rollers of his proposed test bench. Sorry, but I refuse to oblige! An aeroplane is (so I believe), designed to fly, yet aircraft manufacturers waste money on wind tunnels. Steel is used for building locomotives, ships, and bridges, yet all steel makers, and very many users, are so deluded as to buy weird and wonderful testing machines to measure its physical properties. To take a more homely example, electric lamps are made for producing illumination, but I will guarantee that no lamp factory at the present day is without an elaborately equipped photometric laboratory to test, not only candle power, but also spectrum range, actinic values, etc. There was a time when some sections of industry thought they could dispense with the trouble and expense of testing, but most firms who tried it have now found, to their cost, that they were wrong.

While I have the very greatest respect for the memory of George Stephenson as a pioneer of locomotive design, I believe that we have progressed just a little in the matter of accurate standards since his day. In the absence of a better method, there might be something in his "back to back" test as referred to by Mr. Bewan Springer, but I feel sure that no practical engineer would accept it at the present day.

I would like again to point out that I have never advocated *substituting* bench tests for track tests, as some people seem to imagine; but to use them, as I think would be, and is, done in full sized practice, to *supplement* and qualify the data obtained in normal running. It should be remembered that a railway company can obtain excellent comparative data by running engines with standard loads over the same stretch of line under fairly constant conditions, but this privilege is obviously denied to model engineers, whose engines have to run on any old track, under any conditions, in any locality.

Those who consider that track results constitute a *correct standard* of locomotive performance might ponder over a statement made by "L.B.S.C." in the issue of the "M.E." dated June 18th, 1931, to the effect that "three girls with a bit of bell cord hauled the Timken locomotive weighing 350 tons."

Yours faithfully,

London. "B.H.P."

Model Locomotive Efficiencies.

DEAR SIR,—As a contribution to this discussion, I would suggest that a simple form of dynamometer car would be quite easy to make, and might give some interesting results. I would suggest just an ordinary passenger trolley, with a speedometer and spring balance. One's observation would need to be relied on to take both readings at the same time; not highly accurate, but it would give a rough idea of the draw bar horse power.

I would point out that 1/10 h.p. requires a pull of 15 lbs. at $2\frac{1}{2}$ m.p.h., $7\frac{1}{2}$ lbs. at 5 m.p.h. and $3\frac{3}{4}$ lbs. at 10 m.p.h.

Yours faithfully,

Bexhill-on-Sea. C. M. KEILLER.

Making Suspension Levers.

DEAR SIR,—On reading "L.B.S.C.'s" description of how to make the suspension levers and pegs, p. 548, it seemed to me that, for some of us poor tyros, he has made the cart before the horse, so to speak. There must be many like myself who have moderate priced lathes with slight inaccuracies, and the one which crops up here is misalignment of the tailstock. Can we run a reamer up with this offending member and get an accurate hole? Chorus, "No." Therefore I suggest, and find in practice, that it is best in this case either to ream, or better still, bore the hole in the suspension lever first. Then chuck a piece of

¼″ silver steel and turn down to fit the hole in the suspension lever. With care, and plenty of cutting oil, a perfect fit will result. At the same chucking, the 5/32″ × 40 part can be reduced and screwed with tailstock dieholder, thus ensuring the outside diameter of peg being concentric with the screwed hole in frame when assembled.

Yours truly,

Forest Hill. L. C. GLEN-BARBER.

Grinding Twist Drills.

DEAR SIR,—An experience about grinding twist drills may interest you in connection with the note, p. 537, of issue of December 5th. A neighbour, in war time, had a job which called for the boring of a large number of fine holes in blocks of steel some 8 in. square, and from ¾″ to 1″ thick. He was clever at holding the drill in his finger and thumb and retouching the edge, and did the whole job quite rapidly. He found the use of my power drill a convenience, and, as an amateur, I soon wanted to imitate him. The result was a broken drill, and the job of trying to get the broken end out. On learning that he intentionally ground his drills out of centre, as No. 2 in the illustration, it became clear that the hole, being larger than the drill was, in this case, an advantage and indeed a necessity.

I think that twist drills are better ground in this theoretically incorrect way, except perhaps on very rare occasions, and then some other form of drill would perhaps be better than a twist drill.

Yours truly,

Kingston. H.W.S.

Canadian "Switchers."

DEAR SIR,—The switching engine illustrated in your issue of November 14th may be Canadian. The Great Western Railway of Canada was completed from Niagara Falls to Sarnia, Ontario, in 1858, and operated under that name until the middle '80's, when it was absorbed by the old Grand Trunk. At that time, Canadian railways obtained a good deal of equipment from the United States.

From the size of this engine and its tender, it may have been the yard engine of some heavy industry, and that would account for the conspicuous name-plate.

Yours faithfully,

Sarnia, Ont. W. Q. PHILLIPS.

Model Flash Steam Plants.

DEAR SIR,—May I offer some criticism on Mr. Westbury's article in the "M.E." for November 21st.

I am certain his liquid thermostat would work very well in a boat, as similar types are used very successfully in some makes of bakers' ovens. I would, however, like to warn everyone against using this to control a bypass between pump and boiler. I have yet to see a bypass which will keep a steady flow of water into a *flash* boiler. The variations of pressure in these boilers upset them. If the pressure rises in these boilers, more water flows through the bypass. The boiler then gets very hot, as there is very little water in it, and when the water does start to come into the hot tube, it flashes into very hot steam; the pressure rises quickly, and starts the flow of water through the bypass again. A check valve between bypass and boiler helps a little. A steam drum keeps a fairly steady pressure to engine, but does not stop the violent changes of pressure in the boiler.

A much better plan, in my opinion, would be to control the entry of water to the pump, by putting a valve in the suction pipe and coupling it to the thermostat.

From some experiments I have carried out, I find this valve to work so well that I have given up the idea of using variable stroke apparatus. Using a pump ½″ bore by 1″ stroke, running up to 1500 revs. a minute, the feed (or suction I should say) controlled by a needle valve, the water could be delivered from nothing to full capacity, increasing or decreasing as the valve was opened or shut. The same experiment was tried with a pump 3/16″ bore and stroke, running at speeds from 100 to 8000 revs. a minute (approx) with the same results.

The pumps were screwed to a bench and driven by cord round "Meccano" pulleys, from the shaft or pulleys on an electric motor. The efficiency of these pumps on full delivery at the above speeds is approx. 90%; they were of the "Nilson" type as described by "L.B.S.C.," and they cannot be improved on, but they are awkward to get at in a hull. This idea for feed control is not my own, as I was told to try it by a friend. Some air compressors use a similar governing device. Regarding the separate feed pump system, I do not like it. Any tube large enough to house another inside it, is too big for a flash boiler. The finest flash boiler I have tried was 10′ of 5/16″ steel tube. This small boiler could keep a Stuart No. 10 Horizontal engine revving at 3000 r.p.m., and you could not stop the flywheel with the fingers; this with a blowlamp using the small "Optimus" burner. I understand that Messrs. Brown Bros., the Motor Factors, are now selling soft, solid-drawn steel tubing ⅛″ outside diameter. I am going to use this for my next boiler, but would like to hear of a suitable arrangement to keep an equal amount of water in each coil or length of tube, without using separate pumps for each length of tube. The usual method of coupling each coil to a tee pipe, and then from tee by one pipe to pump does not work at all well, as one tube usually gets more water than the other. I want to use four or five lengths of tube, each length being a separate coil.

I am also going to use a vaporising burner as described by Mr. Westbury. About ten years ago I used a similar burner in a small launch, with very good results. This burner came out of a petrol-heated flat iron, which had been scrapped in favour of an electric one. A bigger vaporising tube had to be fitted to it for burning in the open air. Regarding the engine, a well designed single cylinder double-acting engine with a D slide valve, is hard to beat. A few weeks ago I saw a boat without a step doing 30 m.p.h. with a standard Stuart No. 10V engine. It made one of the cleanest runs I have seen for some time.

Yours faithfully,

Sheffield. ANDREW TODD.

Institutions and Societies.

The Society of Model and Experimental Engineers.

Meetings. At Caxton Hall, Westminster, at 7 p.m.

Wednesday, January 1st, 1936, Lecture by Mr. F. J. Slee, B.A., B.Sc., of Shell-Mex and B. P., Ltd., on "The Selection of Oils for Industrial Purposes." This lecture will be supplementary to the one given by Mr. Slee last year.

Any interested reader of the "M.E." can obtain full particulars of the Society, also a card of admission to a meeting and/or a card of admission to view the Society's workshop, by writing to the Secretary, R. W. WRIGHT, 202, Lavender Hill, Enfield, Middlesex.

The Kent Model Engineering Society.

The next meeting of the above will be held on Friday, January 3rd, Mr. F. Bradford will talk on "Model Locomotive Matters"; this will be at 8 p.m., at the Club's headquarters, Sports Bank Hall, Sports Bank St., S.E.6.

It has been decided that the Society should hold their meetings once a fortnight instead of every third week. Starting with the New Year, the first meeting will be as already stated, the following meeting night will be Tuesday, January 14th, and will be a Rummage Sale and Impromptu Talks.

The Kent Society would like to take this opportunity to wish, not only the Kentish modellers, but all engaged in our hobby, the season's compliments.

The Secretary will be pleased to forward full particulars of membership or an invitation to any meeting.

Hon. Secretary, W. R. COOK, 38, Shorndean Street, Catford, S.E.6.

York and District Model Engineering Society.

The next meeting of the above Society will be held on January 3rd, 1936, at The Bay Horse Hotel, Monkgate, York, 7.30 p.m. sharp.

This is to be a real business meeting, as there are officers to elect, and the 1936 programme to be discussed. So I earnestly request the attendance of all members, or any person interested in engineering or craftsmanship of any kind.

Hon. Sec., W. SHEARMAN, Jnr., 28, Terry Street, York.

The Model Power Boat Association.

The second of the series of lecture evenings will be on Thursday, Jan. 9th, at 8 p.m., at the Coronet Hotel, Soho St., London, W.1. Something totally new and highly instructional is to be presented, in the form of two short lectures, by Mr. D. H. Chaddock, on "Supercharging 30 c.c. Engines," and Mr. J. B. Innocent, on "Engine Design in Relation to Supercharging." Readers who are interested in the progress of I.C. engines should on no account miss hearing these lectures and taking part in the ensuing discussion.

Hon. Sec., EDGAR T. WESTBURY, 30, Hackford Road, Brixton, S.W.9.

Ormskirk Society of Model and Experimental Engineers.

Meetings are held at 7.30 each Monday evening at the Clubroom and Workshop, Railway Road, Ormskirk. The workshop is equipped with two lathes, grinder and drilling machine, bench, etc. A four track "O" gauge railway and steam locomotive are in course of construction, and a 2½" gauge testing track is the next on the list.

Further particulars from the Hon. Sec., B. N. BANBROOK, 43, Tower Hill, Ormskirk.

Norwich and District Society of Model Engineers.

The next meeting will be held at the Willis Memorial Workshop, King Street, Norwich, on Thursday, 2nd January, 1936, from 6.30 p.m., and will be a "Model" night. All members are invited to bring a model or piece of work, finished or unfinished, and place it on the bench. The latter is about 35 feet long, so please help to fill it. If you can make your model work, so much the better. There will also be a "For Sale" section. Please bring anything you may have for disposal, with a ticket showing your name, address, and the price.

The workshop is open every night in the week except Thursdays and Saturdays, and a comfortable Club Room is available at any time for senior members.

Hon. Secretary, W. F. A. WAY, 73, Gipsy Lane, Norwich.

Notices.

The Editor invites correspondence and original contributions on all small power engineering and electrical subjects. Matter intended for publication should be clearly written on one side of the paper only, and should invariably bear the sender's name and address. Unless remuneration is specially asked for, it will be assumed that the contribution is offered in the general interest. All MSS. should be accompanied by a stamped envelope addressed for return in the event of rejection. Readers desiring to see the Editor personally can only do so by making an appointment in advance.

All subscriptions and correspondence relating to sales of the paper and books to be addressed to Percival Marshall and Co., Ltd., 13-16, Fisher Street, London, W.C.1. Annual Subscription, £1 1s. 8d., post free, to all parts of the world. Half-yearly bound volumes, 11s. 9d., post free.

All correspondence relating to Advertisements and deposits to be addressed to THE ADVERTISEMENT MANAGER, "The Model Engineer," 13-16, Fisher Street, W.C.1.

Contents.

The asterisk (*) denotes that the subject is illustrated.

P

Q

R

S

T

U

V

W

AUTHOR INDEX TO VOL. 73.

Printed by the ELECTRICAL PRESS, LTD., London, W.C.1, and Maidenhead.

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Ball Journals, $\frac{1}{4}$", 9d.; $\frac{5}{16}$", $10\frac{1}{2}$d.; $\frac{3}{8}$", 1s.; $\frac{1}{2}$", 1s. 2d.—HALL, 30, Collindale Avenue, Erith.

"Holtzapffel's Turning and Mechanical Manipulation," Volumes 1, 3, 4 and 5 for sale. Excellent condition. Offers.—Box 934, MODEL ENGINEER Offices.

Dallmeyre Press Camera, cost £17 6s. 3d. Exchange for model makers Milling Machine in good condition.—CLARK, West Villa, Retford.

A Small 2" Treadle Lathe. Complete, £1 10s. od., and 200 "M.E.'s" 12s.—49, Reading Lane, Hackney, E.8.

Express World Delivery. "Practical Sheet and Plate Metal Work," Atkins, 460 illustrations; "Sheet Metal Workers' Instructor," Warn, 14s. 6d. set. "Blacksmith's Manual," Lillico; "Smithy-Forge,"; "Drop Forging, Die Making, Press Working and Stamping, Practical Blacksmithing," Atkins (world demand), 19s. 9d. set. "Mechanics' Workshop Companion," Templeton, 8s. "Ornamental Turning," Evans (3 vols.) 6s. set. Why not purchase the following, same time: "Simple Decorative Lathe Work," "Turning for Beginners," "Possibilities Small Lathes," Lukin, 6s. set. Show this advertisement to your friends. World delivery. Carriage paid. Use block letters in your address.—ALBERT FEATHER, Mail Order Bookseller (Brand New Books), 93, White Abbey Road, Bradford, Yorkshire.

Casting Moulds for Lead Soldiers, etc. Sample Mould, 2s. 9d. Catalogue free.—Below.

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Quantity Solid Drawn Copper Tube $\frac{1}{2}$" dia., 19 gauge in long lengths. $4\frac{1}{2}$d. per foot, any length cut. Postage extra.—GOODHAND, 177, Marlborough Road, Gillingham, Kent.

The Express Loco' Supplies Co. wish all "M.E." readers the Compliments of the Season.—52, Blanmerle Road, New Eltham.

Jack Horner, $1\frac{3}{4}$" Gauge, Passenger Hauler, coal fired, £5.—YARRINGTON, 115, Coniston Road, Addiscombe.

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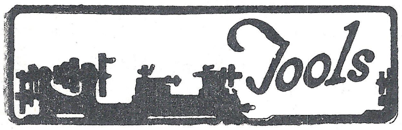

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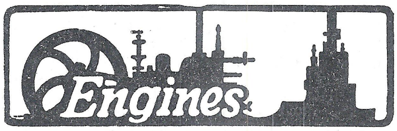

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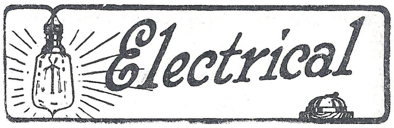

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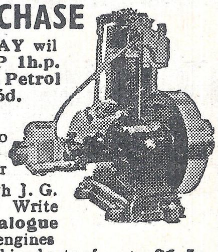

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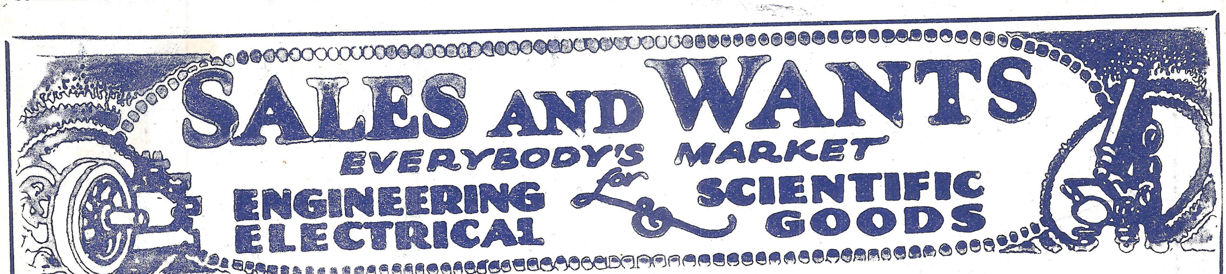

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